COURSE CREDIT REGULATIONS & GRADING SYSTEM

FOR B.TECH, BCA, BSC (H), BBA, BA (H), BCom (H), BBA-LLB (H), M.TECH, MBA, LLM PROGRAMMES

The evaluation scheme at the University shall be based on the internationally prevalent credit systems and continuous evaluation methods.

INTRODUCTION

1.1   Background

Instructional work at The NorthCap University, Gurugram is carried out using credit system of study in semester-based system. The salient features of the credit system are:

  i. Flexibility for students to progress at suitable pace depending on individual interest and ability.

  ii. Continuous evaluation of students' progress.

  iii. Award of grades in a course depending on overall performance of a student.

  iv. Performance measurement by number of earned credits (EC), semester grade point average (SGPA) and cumulative grade point average (CGPA). The use of grades helps in achieving a reasonable spread of total marks for a grade and in reducing variations due to evaluation by different teachers.

  v. Award of degree to a student on the basis of total ECs and value of CGPA.

There would be two regular semesters for instructional and evaluation work and also an additional to summer semester in each academic year. The odd numbered semesters (I, III, V, VII & IX) would start in July on a specified date and end in November on a date as per the yearly academic calendar. The even numbered semesters (II, IV, VI, VIII & X) would start in January on a specified date and end in May on a date as per the yearly academic calendar. The summer semes-ter would cover practical training in industry / holding of regular classes in some courses where possible as per rules for failed students and / or holding of major test / end term practical exam. In such courses, all regulations for various requirements remain the same as for those in a regular semester.

The present document describes course credit regulations and grading system for UG (Under-graduate) and PG (Post-graduate) degrees. The regulations for PhD degree are covered separately.

The credit system including grading award system is now mandated by regulatory bodies viz. UGC/AICTE/BCI etc and followed world over. The focus is flexibility to students to choose and earn credits. Grading provides an idea about the performance of the student. Continuous evaluation is the essence of the system.

1.2   Programmes Offered

The NorthCap University, Gurugram offers a wide range of academic programmes for students with various technical, managerial and law backgrounds. Admission to these programmes are based on JEE-MAIN, GATE, CAT & MAT, CLAT etc. which are reputed national level entrance tests and marks in the qualifying exam followed by personal interviews in some cases. Detailed information in this regard is provided separately.

The various programmes offered by The NorthCap University, Gurugram are classified as undergraduate, postgraduate and research programmes. All the undergraduate programmes admit 10+2 passed students while the students are admitted to the postgraduate programmes after they have obtained atleast a Bachelor degree in relevant area. Research programmes for Ph.D. degree are to be separately covered. The information in the tabular form regarding various programmes offered with their specialization is listed below:

I. UNDERGRADUATE PROGRAMMES

SCHOOL / DEPARTMENT	PROGRAMME	CODE	
SCHOOL OF ENGG. AND TECHNOLOGY	DEPARTMENT OF COMPUTER SC. & AND ENGG.	B. TECH. IN COMPUTER SCIENCE & ENGINEERING WITH SPECIALIZATION IN 1. DATA SCIENCE 2. CYBER SECURITY & FORENSICS 3. GAMING AR & VR 4. FULL STACK DEVELOPMENT 5. BLOCKCHAIN 6. CLOUD COMPUTING 7. ARTIFICIAL INTELIGENCE & MACHINE LEARNING	CS1
		BCA WITH SPECIALIZATION IN 1. ANIMATION AND GAMING 2. WEB APPLICATION DEVELOPMENT	CS2

SCHOOL / DEPARTMENT	PROGRAMME	CODE	
SCHOOL OF ENGG. AND TECHNOLOGY	DEPARTMENT OF ELECTRICAL, ELECTRONICS & COMMUNICATION	B. TECH. IN ELECTRONIC & COMMUNICATION ENGINEERING. WITH SPECIALIZATION IN 1. INTERNET OF THINGS 2. VLSI DESIGN	EC1
		BCA WITH SPECIALIZATION IN 1. MOBILE APPLICATIONS	EC2
	DEPARTMENT OF MECHANICAL ENGG.	B. TECH. IN MECHANICAL ENGINEERING	ME1
	DEPARTMENT OF APPLIED SCIENCES	1. BSC(H) MATHEMATICS 2. BSC IN MATHEMATICS DATA SCIENCE	MA1
		BSC(H) CHEMISTRY	CH1
SCHOOL OF MANAGEMENT & LIBERAL STUDIES	1. BBA 2. BBA IN BUSINESS ANALYTICS 3. BBA IN DIGITAL MARKETING 4. BBA IN ENTREPRENEURSHIP & FAMILY BUSINESS		SM1
	B.COM (HONS) B.COM (HONS) SPECIALIZATION IN FINANCIAL MARKETS		SM2
	B.A.(H) PSYCHOLOGY		SM3
	B.A.(H) ECONOMICS		SM4
	B.A.(H) ENGLISH		SM6
SCHOOL OF LAW	BBA – LLB (HONS.)		BL1

II. POSTGRADUATE PROGRAMMES

SCHOOL /DEPARTMENT	PROGRAMME		CODE
SCHOOL OF ENGG.AND TECHNOLOGY.	DEPARTMENT OF COMPUTER SC. & AND ENGG.	M.TECH. IN COMPUTER SCIENCE & ENGG.	CS5
	DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING	M.TECH. IN CIVIL ENGINEERING	CE5
	DEPARTMENT OF ELECTRICAL, ELECTRONICS & COMMUNICATION ENGINEERING	M.TECH. IN ELECTRONICS & COMMUNICATION ENGG.	EC5
	DEPARTMENT OF MECHANICAL ENGINEERING	M.TECH. IN MECHANICAL ENGINEERING	ME5
SCHOOL OF MANAGEMENT& LIBERAL STUDIES	MBA WITH DUAL SPECIALIZATION		SM5
SCHOOL OF LAW	LLM		ML5

1.3 Academic Departments

Each course is offered by an academic department. Some courses are jointly offered by multiple departments and are called interdisciplinary courses. The various academic departments are given a unique two-letter code which is shown in the table below.

NAME OF ACADEMIC DEPARTMENT	BRANCH NAME	CODE
Applied Sciences	Applied Sciences	CH
		MA
		PY
Civil & Environmental Engineering	Civil Engineering	CE
Computer Science Engineering & Information Technology	Computer Science & Engineering	CS
Electrical, Electronics and Communication Engineering	Electronics & Communication Engineering	EC
Mechanical Engineering	Mechanical Engineering	ME
Central Learning Language	-	CL
School of Management & Liberal Studies	Management Studies	SM
School of Law	Law Studies	SL

2. COURSE STRUCTURE AND CREDIT SYSTEM

2.1 Course Credits Assignment

Each course, except few special courses, has a certain number of credits assigned to it depending upon the needs for its Lecture, Tutorial and Practice periods in a week. The weightage of credit is also indicative of the academic expectation that includes in-class contact and self-study outside of class hours. The experts allot an appropriate weight (L-T-P) to the course at the time of designing the scheme/syllabus of the Programme. Fixing L-T-P for a course is an expert-decision based on the importance of that course in that programme, regulatory agency guidelines and endorsed by BOS.

The Credit of the course is computed from the weight (L-T-P) of the course and thus Credit of a course gets indicated in the scheme of the programme. The credits for courses can be computed from its components as below:-

Lectures and Tutorials: One lecture or tutorial period per week is assigned one credit. Practice/Laboratory: One

laboratory/practice period per week is assigned half credit. The Credit of a course thus depends on its L-T-P structure.

Examples:-

1. Consider a course having its L-T-P structure as (3-1-2). The credit for this course will be 3+1+1 = 5.
2. Consider a course having its L-T-P structure as (2-0-1). The credit for this course will be 2+0+.5= 2.5.

Courses are also taught in modular form where total number of hours of a course is considered. E.g. a course with L-T-P of 3-0-2 which is being conducted for full semester (15 weeks) is taught for 75 hours with 4 credits with required amount of theory and practical hours.

2.2 Course Numbering Scheme

Each course at the University has a unique number, called as COURSE CODE, which consists of three alphabets, followed by three numerals.

Example and Explanation of a Course Code:

CSL314

In the above course code,

The first two alphabets combined (from left) denote the 'discipline code' of the concerned department offering this course (See section 2 (ii)).

The third alphabet character (from left) denotes the 'nature' of this course. Please see the table shown below forthe details about the 'nature' of the various courses.

The fourth character from left is a numeral which denotes the level of the course which determines the maturity required for registering for this course.

100-400 level courses: Core and elective courses for UG programmes.

500-600 level courses: Core and elective courses for PG programmes. These courses are not open to any UG

student.700-above level courses: Pre Ph. D. courses.

Last two numerals combined denote the unique identification number for the course. Odd number courses will runin odd semesters and even number courses will run in even semesters except those which are having zero at the end. The course having zero as the last numeral can run in either semesters.

For load balancing purposes a particular course code may be offered in any semester.

Codes for the nature of the course are as follows:

NATURE CODE	NATURE DESCRIPTION
L	ALL LECTURE BASED COURSES EXCLUDINGN AND V NATURE OF COURSES. (OTHER THAN LECTURE PERIODS, THESE COURSES CAN HAVE TUTORIAL AND PRACTICAL PERIODS). E.G. L-T-P STRUCTURES 3-0-0, 3-1-2, 3-0-2, 2-0-0, ETC.
P	LABORATORY BASED COURSES, USUALLY WITHOUT ANY LECTURE(OR HAVING AT MOST 1 LECTURE) PER WEEK, E.G. PRACTICAL OR LABORATORY WORK WITH L-T-P STRUCTURES LIKE1-0-3, 0-0-4, 0-1-3, 1-2-6, ETC.
D	PROJECT COURSES LEADING TO DISSERTATION (MAJOR PROJECT, MINOR PROJECT, MINI PROJECT) E.G. L-T-P STRUCTURES 0-0-10, 0-0-6, ETC.
T	INDUSTRIAL OR IN-HOUSE OR PRACTICAL TRAINING TYPE COURSES
C	COLLOQUIUM (OR SEMINAR)
R	PROFESSIONAL PRACTICE
N	INTRODUCTION TO THE PROGRAMME OR INTRODUCTION TO HUMANITIES ANDSOCIAL SCIENCES, ETC.
S	INDEPENDENT STUDY COURSES
V	VALUE ADDED COURSES
M	MOOC CERTIFICATION COURSES

2.3   Earned Credits

At the end of each semester, a letter grade is awarded to a student in each course for which she/he had registered depending upon her/his performance through continuously evaluation and major exam. On obtaining any pass grade ina course, the student owns the course-credits as her/his earned credits corresponding to that course applicable for her/his count while computing SGPA or CGPA. A student's performance is measured by the number of 'earned credits' by her/him, then by the "Points earned" from each amount of "earned credit" and finally by the measure grade point average.

A minimum number of total earned credits are required in a semester for continuation of registration at any stage to the higher semester. A minimum number of total earned credits as specified in the scheme of that programme are also required in order to qualify for a degree at the end of last semesters as applicable.

2.4   Pre-requisites

Some courses, other than 100 level (first year) courses, have pre-requisites mentioned, which may be another course or some other requirement perceived by programme coordinators depending upon students background. A student may be allowed to take a particular course which has a pre-requisite, if he/she had registered and met the minimum attendance requirements in prerequisite course.

2.5   Course Content Description

Course content description consists of course code, title of the course, credit and L–T-P, pre-requisite and description of the content. Content description for all the courses are given in the section-10. An example is shown here:

> **MEL306: Machine Design II(4 Credits; 2-2-0)**
> **Pre-Requisite Course: MEL305**
> Selection of fits and tolerances (types of fits, fit symbols, fit selection guidelines, selective assembly); Design of bolted joints (types of bolts and screws, standards and terminology, failure modes, critical stresses, preloading effects, tightening torque, systems of bolts under torsion and bending); Design of springs (types and applications, spring materials, manufacturing process, design of helical springs, buckling and surge considerations); Design of gears (typesand applications, spur gear tooth profile, gear manufacturing, stress analysis of spur gears, lubrication, design based on tooth bending strength, design based on surface durability); Design for corrosion control (chemistry of corrosion, electrode and electrolyte heterogeneity, techniques to control corrosion, corrosion plus static loads, corrosion plus cyclic loads); Design of brakes and clutches (types, torque transmitting capacity, brake and clutch materials, energy and thermal considerations).
>
> Tutorial(T): Solving problems related to the syllabus; Presentations by students related to the their course mini projects

2.6   Programme Coordinator

Programme coordinator is a senior faculty member of the offering department who will coordinate each and every activity related to that programme with all the concerned persons/ departments/ sections/ offices of the University.

2.7   Course Coordinator

Every course is usually coordinated by a faculty member of the offering Department. She/he has the full responsibility for proper conduction of the classes of that course, coordinating the academic work with other faculty members involved in teaching of that course, moderation of grades and submitting all the required information of that course to the programme coordinator in time. In case of any difficulty faced by any student related to a course, the student is expected to approach the respective course coordinator for advice and clarification.

3.   REGISTRATION AND ATTENDANCE RULES

3.1   REGISTRATION

3.1.1 PURPOSE

The purpose of registration is to include the name of a student in the roll lists of the courses that the student wishes to study in a particular semester. Registration is a mandatory procedure to be completed personally by the student for eachsemester on the specified date before the beginning of a semester as given in the Academic Calendar.

There are two modes of registration. These are:

 I.   Regular Study Mode- In this mode of registration, student requires to attend regular classes of the course. Minimumattendance requirement has to be fulfilled under this mode. This mode of registration is available for all courses.

 II. Supplementary Exam Mode- In this mode of registration, student does not require attending classes. She/he has to only appear in Minor Test and Major Test to pass a course. Marks under other heads remain unchanged. This mode of registration is available only for failed courses.

3.1.2 LATE REGISTRATION

Registration after due date (as specified in the Academic Calendar) will be done only after paying a fine of Rs.1000. This provision will be applicable only for first two weeks after commencement of classes.

Students will not be allowed to attend classes and will be marked absent during the non-registered status. Non-

Registered students beyond two weeks of commencement of classes will lose the entire semester.

3.1.3 Course Counselling

Before the registration, each student must meet the programme coordinator/adviser appointed by the concerned HODto choose the appropriate courses keeping in view the past performance, his/her interest in a course, backlog of coursesetc.

3.1.4 Credit Course

Credit courses are the courses having weight-age / credits and the points earned in these courses are used in computation of SGPA & CGPA. Credit courses are placed in various categories like applied sciences, engineering, language courses, programme core courses, programme elective courses, emerging area elective, open electives etc. as per the requirement of the scheme of the programme concerned.

3.1.5 Practical Training

Before going on Practical training, a student must register for practical training course with the approval of Department Training Coordinator (DTC) concerned and TPO of the institute. A report in the specified format must be submitted within 14 days of the regular semester immediately following the training period.

A regular grade will be awarded after evaluation process which includes presentation of the report before the department committee convened by the DTC.

3.1.6 Value Added Course

These courses are special topic courses based on industries needs and are meant to enhance employability of students e.g. personality development, software based courses, knowledge courses etc.

3.1.7 Minimum Number of Student in a Course

No elective course will run if the number of students registered for a course is less than 20. This may also depend on the availability of a suitable faculty member in the area of the elective. If on the day of registration, the number of those registered is less than the above, the course will be dropped and registration of the students will be automatically transferred to their next or available choice.

3.2 Attendance rules

A student is expected to attend all lectures, tutorials and practice classes and VA courses etc.

3.2.1 Requirements

i. The final attendance requirement will be a minimum of 70% per course calculated till the last teaching day. A student not satisfying the minimum attendance requirement in a particular course will be detained in that course.

However, to provide wider exposure to students and increase visibility of the university at state/national & International level, the university encourages, participation of talented students in well recognized competitions or any other such event approved by university. Students nominated / deputed by the University for participation in these events/competitions shall be given due consideration for their absence from classes. This period shall be treated as Leave of Absence for attendance purposes. These leaves of absence shall be endorsed by the Chairman, Student Activities & Leadership committee & approved by the HOD before being sent to the ERP.

All such Leaves of absence shall not exceed 10% of the classes in the semester. The concerned faculty shall ask these students to submit extra assignments to makeup for any study losses.

ii. The above requirements will not be relaxed under any circumstances whatever.

3.2.2 Attendance Calculation Norms

For the purpose of calculating attendance in each course, the attendance in the number of scheduled lecture class, tutorial class and practice class (regardless of contact hours in the scheduled classes) will be added.

3.2.3 Detained student

The ineligible student will be placed in 'Detained' category for the course and the registration for that particular course will be cancelled and 'Detained' will be mentioned in the grade sheet . The student has to again register for the same coursein subsequent regular semester as early as possible, provided CGPA requirement is met and time table permits, if it is a programme core. Otherwise, the course can be substituted by another course in the same category if it happens to be anelective course or a non-compulsory course, provided the course can be run keeping in view other constraints like

i. Minimum number of students in the course, as decided from time to time.

ii. Faculty availability and

iii. Availability of Slot / Time table.

3.2.4 Midterm Warning for Short attendance

There will be a provision for issuing a written warning to the students if in any course, his/her attendance falls below 70%in any course till the completion of approximately half the number of teaching days in a semester as mentioned in the Academic Calendar for the semester concerned.

4.   GRADING SYSTEM

4.1   Introduction

The grading system reflects a student's proficiency in the course. The grade awarded to a student in a course will be based on the performance of the student in Minor test, assignment, viva-voice, lab work, online test, seminar, workshop presentations, group discussions, quiz, etc. whichever be applicable as per scheme and in the Major test, at the end of the summer (or at the end of the summer semester if there are any courses to be taught during summer).

In a course, every candidate will be examined as per the syllabus of the concerned programme approved by the Academic Council from time to time. The credits and contact hours per week have been specified for each course in the syllabus.

Appearing in the Major test of a course will be allowed to a regular student if:-

i. She/he has been on the rolls of the University during the semester, and she/he has satisfied the attendance criteria in the course as per the Attendance Rule (see Section 3.2).

ii. There is no pending case of indiscipline in his/her name, and

iii. She/he is not a defaulter in payment of tuition fee or any other dues of The NorthCap University, Gurugram in any case.

4.2   Grades and Grade Points

The University follows a relative grading system. Corresponding to each course registered, a student obtains a letter gradeat the end of the semester (i.e. at the end of the semester, irrespective of his presence/absence in the examination).

There are Eight (08) types of grades awarded in The NorthCap University to the students as mentioned in the following table:

ACADEMIC PERFORMANCE	LETTER GRADES	GRADE POINTS
OUTSTANDING	A+	10
EXCELLENT	A	9
VERY GOOD	B+	8
GOOD	B	7
AVERAGE	C+	6
BELOW AVERAGE	C	5
MARGINAL	D	4
FAIL	F	0

Note:

i. "D" or above grades are pass grades for credit courses.

In a credit course, if a student obtains any pass grade, she/he earns Points from this course in the semester concerned.
Earned grade Points = Credit of the course × Grade Points

4.3   Evaluation System

The performance of the student in the credit-grading system is evaluated throughout the semester. The methodology used for the evaluation is tabulated below:

S. No.	TYPE OF COURSE	PARTICULAR	ALLOTTED RANGE OF MARKS	PASS CRITERIA
1	Theory (L-0-0)/ (L-T-0)/(L-0-P)*	Minor Test	25%	Must Secure 30% Marks Out of Combined Marks of Major Test Plus Minor Test with Overall 40% Marks in Total.
		Major Test	45%	
		Continuous Evaluation Through Class Tests/Practice/ Assignments/Presentation/Quiz	20%	
		Online Quiz	10%	
2	Theory+ Practical (L-T-P/L-0-P)	Minor Test	15%	Must Secure 30% Marks Out of Combined Marks of Major Test Plus Minor Test with Overall 40% Marks in Total.
		Major Test	35%	
		Continuous Evaluation Through Class Tests/Practice/Assignments/ Presentation /Quiz	10%	
		Online Quiz	5%	
		Lab Work	35%	
3	Practical/Practice or for The Courses of (1-0-P) (0-0-P)	Regular Practical/Practice & Report Writing	70%	Must Secure at Least 40% Marks in Total.
		End Semester Practical/Drawing Tests Including Viva-Voce	30%	
4	Project Based Course (L-T-P/L-T-0/L-0-P/L-0-0)	End Term Project	40%	Must Secure 30% Marks Out of Combined Marks of End Term Project Plus Major Test with Overall 40% Marks in Total.
		Major Test	35%	
		Class Test/ Assignment	15%	
		Class Participation Evaluation Through Class Tests/Practice/ Assignments/Presentation/Quiz	10%	

* - Course(s) without prescribed lab work.

The evaluation of course like Practical training, seminar and dissertation are performed in different manners and discussed as follows:

i. Practical Training: A student has to undergo practical training twice during his/her BTech programme for the specified period mentioned in the syllabi of the training courses, first after fourth semester and second after sixth semester during the summer vacations. Then, she/he will be registered for the practical training course in next semester. The training coordinator of the department will scrutinize the training report and certificates and will arrange the presentation of students in front of the committee constituted by the HOD for the purpose. A regular grade will be awarded by the committee.

ii. Seminar: A topic is usually chosen by a student which is required to get approved by the departmental committee made for the purpose. The evaluation will be done by a seminar evaluation committee to be constituted by the HOD concerned. They will follow their own methodology for awarding grade.

iii. Project/Dissertation: The projects can be done in-house (The NorthCap University campus) or in any industry.

The inhouse project may be fabricated into working model which has a long-lasting value for the institute and give knowledgeenhancement practical orientation and a sense of satisfaction to the students. Students are endorsed in doing the project inan industry and they can do so after getting the prior approval from the Departmental Project Committee.

The following points need attention by the student regarding project/dissertation evaluation purpose:

i. All students are assigned internal guide for their project by their department.

ii. If the project is done in an industry, there should be an external guide in the industry where the project is being done, in addition to the internal guide (from the department/institute).

iii. The internal guide will visit the project site at least once during the course of the project. The internal guide should also have constant interaction with the external guide and monitor the progress of the students. (Applicable to S. No. ii).

iv. Students have to finalize their project title, the guide, their batch mates, and the place of work and the schedule of work along with 'Gantt Chart' (activity chart) and submit to the Departmental Project Committee as notified by the departments.

v. A project diary (a Project/Training Diary is provided by the department to each student having Project/Training as a part ofthe curriculum) will have to be maintained by every student.

vi. The project work is intended to inculcate the following in the students.

- Project planning & scheduling skills (Project Management)
- Practical experience
- Team working
- Creativity and research orientation
- Report writing skills

vii. Final Year B.Tech. project work may be done individually or in a group not exceeding 4 students.

viii.There should be continuous evaluation of the students' performance in the project work and evaluation plan should be notified by the department well in advance.

ix. Project review and evaluation will be done by a Project Evaluation Committee constituted by the Departmental Project Committee. The Project Guide, the Project Co-ordinator must be members of the Project Evaluation Committee.

x. The final viva-voice will be conducted as per the schedule given by the Controller of Examinations. The evaluation during the final viva-voice will be done jointly and in presence of both internal and external examiners (appointed by the Controllerof Examinations). The evaluation will be done as per distribution mentioned in "Project Evaluation Form".

xi. External examiners for evaluation of BTech projects shall be interdisciplinary faculty from within the University.

xii. Any extension required to be given to any project shall require formal approval of Hon'ble VC through proper channel.

The marking scheme is divided into two sections. The following is the breakup regarding the marks in the project/ Dissertation:-

SECTION	CATEGORY	MARKS
A (MID TERM EVALUATION)	COMMITTEE ASSESSMENT	20%
	SUPERVISOR'S ASSESSMENT	10%
B (END TERM EVALUATION)	QUANTUM OF WORK (DEMONSTRATIONOF THE MODEL IF ANY)	15%
	WRITTEN REPORT	15%
	PRESENTATION	10%
	ANSWERING QUESTIONS	10%
	SUPERVISOR'S ASSESMENT	20%

4.4   Grading Method

The NorthCap University is having relative grading system. The grading reflects a student's own proficiency in any course. In relative grading, students are in competition with one another for a limited number of grades in each category, and a student's grade is based on his/her relative position in the class.

This system is well established and working well in leading university and accounts for tests that are too hard or too easy, too strict or too lenient evaluation etc.) because the scale automatically moves up or down. Students appreciate relative grading for much the same reason.

The key features of the "Relative Grading" methodology adopted at The NorthCap are as follows:

1. Marks have no absolute correlation with grades. The relationship between the marks obtained and the grade awarded in a course is relative, based on the average performance of the batch in that course.

2. Minimum 80% marks will be required for getting "A+" grade (Highest Grade). However, mere getting 80% marks will not make any student entitled for getting an "A+" Grade. Hence, it is a necessary condition, but not the sufficient one.

3. Minimum 40% Marks (with atleast 40% in theory) is required to get a "D" grade (Lowest pass grade).

4. "Standard deviation technique" of relative grading will be adopted to grade student's performance in a course having more than 40-45 registrations, as it is expected to follow a normal distribution. In this system student grades are based on their distance from the mean score for the class rather than on an arbitrary scale.

5. "Clustering approach with natural gaps" of relative grading will be adapted to grade student's performance in a course having less than 40-45 registrations. In this method, students' total course scores are arranged in descending order and the teacher looks for naturally-occurring gaps in the distribution of the scores to decide the marks spread for any grade. This reduces variance of marks within a grade.

6. Moderation of grades, if required shall be done by a committee chaired by HOD/Dean/Vice Chancellor

4.5   Grade Point Averages – SGPA and CGPA.

There are two types of Grade Point Averages (GPA), which are:-

i. Semester Grade Point Average (SGPA)

ii. Cumulative Grade Point Average (CGPA)

While SGPA is a measure for a semester performance only, CGPA is a measure of performance upto any specified semester beginning from the first semester. Every student earns a distinct SGPA and a distinct CGPA at the end of each specified semester.

4.5.1   Calculations of SGPA for a Semester

All the courses for which a student has registered in the semester and awarded one of the A+, A, B+, B, C+, C and D grades in this semester are considered for computing SGPA.

The Mathematical Formula

Where, SGPA
$$SGPA = \frac{\sum C_i P_i}{\sum C_i}$$

Ci   = Course Credit of the course of a semester for which SGPA is to be calculated for a student.
Ci Pi   = Grade Point earned by the student in the course.
i   = 1, 2, 3………m, represents the number of courses passed as per table in section 4.3 in that semester.

4.5.2   Calculation of CGPA up-to a Semester

All the courses for which a student has registered up-to that semester beginning from the first semester and awarded one of the A+, A, B+, B, C+, C & D grades are considered in computing the CGPA upto a specified semester.

The Mathematical Formula

Where, CGPA
$$CGPA = \frac{\sum C_j P_j}{\sum C_j}$$

Cj   = Course Credit of the course of a semester for which SGPA is to be calculated for a student.
Cj Pj   = Grade Point earned by the student in the course.
j   = 1, 2, 3………m, represents the number of courses passed as per table in section 4.3 in that semester.

4.5.3 A Hypothetical Example Showing Computation of SGPA and CGPA

Consider the performance of a student Mr. Z in Semester-I, as mentioned below (supposing that Mr. Z has registered for the following six courses as per his scheme).

COURSE NO.	TYPE OF THE COURSE	COURSE CREDIT	GRADE AWARDED (TO THE STUDENT)	EARNED CREDITS (BY THE STUDENT)	EARNED GRADE POINTS (BY THE STUDENT)	POINT EARNED (BY THE STUDENT)
ECEXXX	CORE	5	C+	5	6	30
CSLXXX	CORE	4	C	4	5	20
CSLXXX	CORE	4	A+	4	10	40
CELXXX	CORE	2	B+	2	8	16
MELXXX	ELECTIVE	4	D	4	4	16
TOTAL =		19		19		122

From the above table, the following are computed:-

Credits registered by Mr. Z in this Semester – I is		=	19
Earned credits in this semester		=	19
Points Earned by Mr. Z in this semester		=	122
SGPA	= 122/19	=	6.42
CGPA	= 122/19	=	6.42

Now, consider the performance of the same student Mr. Z in Semester-II, as mentioned below (supposing that Mr. Z has registered for the following seven courses as per his scheme).

COURSE NO.	TYPE OF THE COURSE	COURSE CREDIT	GRADE AWARDED (TO THE STUDENT)	EARNED CREDITS(BY THE STUDENT)	GRADE POINTS (EARNED BY THE STUDENT)	POINT EARNED(BY THE STUDENT)
CELXXX	CORE	5	B+	5	8	40
CSLXXX	CORE	4	F	0	0	00
CSPXXX	CORE	2	B	2	7	14
CSLXXX	CORE	4	D	4	4	16
MELXXX	ELECTIVE	4	A+	4	10	40
TOTAL =		19		15		110

From the above table, the following are computed:-

Credits registered by Mr. Z in this Semester-II is = 19

Earned credits in this semester = 15

Points Earned in this semester = 110

SGPA = 110/15 = 7.33

Points Earned in all semesters done so far

= 122 (total of all previous semesters) + 110 (current semester) = 232

Credits Earned in all semesters done so far

= 19 (total of all previous semesters) + 15 (current semester) = 34

CGPA = 232/34 = 6.82

Semester-II performance: SGPA = 7.33, CGPA = 6.82 (Upto Semester-II)

4.6 Performance Classification

A student has to be declared eligible for award of the degree as per section 5.1 for UG and section 5.2 of this ordinance for PG students.

Classification of performance of the students at the end of the programme (after completing all the programme requirements) will be based on CGPA (Cumulative Grade Point Average) earned, as indicated below:

CLASSIFICATION OF PERFORMANCE FOR BTech PROGRAMMES	CGPA
FIRST CLASS WITH DISTINCTION	8.50 AND ABOVE AND HAVE PASSED ALL COURSES IN FIRST ATTEMPT
FIRST CLASS	6.00 TO 8.49
SECOND CLASS	4.50 TO 5.99
NOT SUCCESSFUL	BELOW 4.50

CLASSIFICATION OF PERFORMANCE FOR MTech PROGRAMMES	CGPA
FIRST CLASS WITH DISTINCTION	8.50 AND ABOVE AND HAVE PASSED ALL COURSES IN FIRST
FIRST CLASS	6.00 TO 8.49
SECOND CLASS	5.00 TO 5.99
NOT SUCCESSFUL	BELOW 5.00

4.7 Moderation of Grades

Moderation of grades is required to minimize the effect of individual marking/checking techniques. The award of grades in various courses is moderated by a high level committee duly appointed by Hon'ble Vice-Chancellor from time to time.

4.8 Dean's List

The Dean's List is generated based on mentioned below eligibility criterion:

A student of any Programme of The NorthCap University (NCU) is eligible to be featured in the Dean's List of any Semester Result, if:

1. He/She has scored 9.50 CGPA or above in that semester result.
2. He/She has secured top position (First position) in the batch of that programme (across all sections) and has a minimumCGPA of 9.00.

Note : A student has to pass all courses in single attempt to become eligible for featuring in the Dean's list of any semester.

(f) Conversion from CGPA to Percentage

The formula to convert CGPA to Percentage is percentage = (CGPA X 10)

5. UG DEGREE REGULATIONS AND PERFORMANCE MONITORING

5.1 Degree Requirements

All the following requirements are mandatorily to be fulfilled for award of a UG Degree:

    i. Completion of earned credits as specified in the scheme of each UG Programmes.

    ii. Obtaining a minimum CGPA of 4.50 at the end of the programme.

    iii. If a student completes required credits for UG with CGPA less than 4.50, he may be allowed to do additional elective course under any category to improve the CGPA within the maximum time limit for the completion of UG degrees.

    iv. Completion of practical training as prescribed by the concerned department.

5.2 For continuation of registration at the end of every Academic year

The following rules will be applicable:

To be eligible for continuation of registration at the end of every Academic Year (including summer semester), the number of earned credits for a student should not be less than those specified in the table below:

For 5 Years UG Programme

S. NO.	ACADEMIC YEAR	MINIMUM NO. OF EARNED CREDITS (EC)
1	I	10% of total credits of the programme
2	II	25% of total credits of the programme
3	III	40% of total credits of the programme
4	IV	55% of total credits of the programme
5	V	70% of total credits of the programme
6	VI	85% of total credits of the programme
7	VII	100% of total credits of the programme

For 4 Years UG Programme

S. NO.	ACADEMIC YEAR	MINIMUM NO. OF EARNED CREDITS (EC)
1	I	15% of total credits of the programme
2	II	30% of total credits of the programme
3	III	45% of total credits of the programme
4	IV	60% of total credits of the programme
5	V	80% of total credits of the programme
6	VI	100% of total credits of the programme

For 3 Years UG Programme

S. NO.	ACADEMIC YEAR	MINIMUM NO. OF EARNED CREDITS (EC)
1	I	20% of total credits of the programme
2	II	40% of total credits of the programme
3	III	60% of total credits of the programme
4	IV	80% of total credits of the programme
5	V	100% of total credits of the programme

5.3 Maximum Time to Complete the Degree

The maximum time for completion of any UG degree is $N + 2$ years. Where N is the minimum time to complete that UG Programme.

6. PG DEGREE REGULATIONS AND PERFORMANCE MONITORING

6.1   Degree Requirements

All the following requirements are mandatorily to be fulfilled to get PG Degree:

i. Completion of earned credits as specified in the scheme of each PG Programme.

ii. Obtaining a minimum CGPA of 5.00 at the end of the programme.

iii. If a student completes required credits for PG with CGPA less than 5.00, he may be allowed to do additional elective Course under any category to improve the CGPA within the maximum time limit for the completion of PG degree.

iv. Completion of practical training as prescribed by the concerned department.

6.2   For continuation of registration at the end of every Academic Year

The following rules will be applicable:

To be eligible for continuation of registration at the end of every Academic Year (including summer semester), the number of earned credits for a student should not be less than those specified in the table below:

1   YEAR PG PROGRAMMES

S. NO.	ACADEMIC YEAR	MINIMUM NO. OF EARNED CREDITS (EC)
1	I	30% of total credits of the programme
2	II	65% of total credits of the programme
3	III	100% of total credits of the programme

2   YEAR PG PROGRAMMES

S. NO.	ACADEMIC YEAR	MINIMUM NO. OF EARNED CREDITS (EC)
1	I	20% of total credits of the programme
2	II	45% of total credits of the programme
3	III	70% of total credits of the programme
4	IV	100% of total credits of the programme

3   YEAR PG PROGRAMMES

S. NO.	ACADEMIC YEAR	MINIMUM NO. OF EARNED CREDITS (EC)
1	I	10% of total credits of the programme
2	II	30% of total credits of the programme
3	III	50% of total credits of the programme
4	IV	70% of total credits of the programme
5	V	100% of total credits of the programme

6.3   Maximum Time to Complete the Degree

The maximum time for completion of any PG degree is $N + 2$ years. Where N is the minimum time to complete that PG Programme.

7.   RE-MAJOR TEST

NCU has the provision to conduct Re-Major Test during the summer in a very limited numbers to cater for extremely exceptional failure cases.

The eligibility guidelines in this regards are summarized below:-

I.   Student(s) leading to "Year loss" due to failure in only one course.

II. Student(s) missing placements or joining after placements obtained through SPA due to failure in only one course.

III. Mass failures (atleast 33% failure) in any course.

IV. Re-Major Test opportunity in accordance to S. No. (I & II) will be available to any student only once in his/her whole programme.

8.   MANAGEMENT OF RE-APPEAR STUDENTS

NCU has a very comprehensive policy to manage re-appear students. There are two categories of re-appear students. First is "Detained students" who have not met minimum attendance requirement as mentioned in Para. 3.2 and second is "Failed students" who have not secured minimum passing marks as mentioned in Para. 4.3.

The rules in this regards are summarized below:-

I. Detained Students:

a)   Detained students will require registering under "Regular Study Mode" only and will require attending regular classes with junior batches as per the availability of time-table.

b)   In case of clashing of re-appear courses with courses of regular semester, detained students will have to drop one ormore course of regular semester.

c)   If no free slots are available during regular duration of the programme, such students will attend classes of re-appearcourse(s) after the completion of the programme, but within the maximum duration allowed for the programme.

d)   University will not be responsible for providing free slots for such cases.

II. Failed Students:

a)   Failed students will be allowed to register under "Supplementary Exam Mode" as and when the course is offered, butwithin the maximum period of completion of programme.

b)   Students registering under "Supplementary Exam Mode" will be allowed to appear in Minor Test as well along withMajor Test to pass a course. Marks under other heads remain unchanged.

9.   SUMMER SEMESTER

Summer Semester is a common feature throughout the world to cater to student's backlog or 'year-loss'. This facility notonly helps students but also considerable reduces the burden of failures on the entire system. Summer semester is optional for the students. Classes can be conducted during the months of June and July for such students provided the department finds it feasible to run the courses with available resources.

General Aspects: Summer semester will be of 6 weeks duration in the month of June-July, which will take care of classesas well as the evaluations. The teaching scheme, the syllabus and the course credits for each course offered in the summer semester shall be the same as that in the approved scheme & syllabus, in force, for the respective course in a Programme. The total number of contact hours for the course shall be compressed (up to 80%) and therefore, the courses run at accelerated pace, (For example 9 hours of instructions per week is expected for 3-0-0 course). The registration, examination and assessment and grading etc. shall be carried out in the same way as being carried for regular semester courses. Calendar for the summer semester shall be notified separately by the Dean Office.

Eligibility Criteria: Any final year student who has either "detained" or "failed" in a course will be eligible for summer semester.

Registration: The students eligible for registration in summer semester will have to apply, by filling-in, the requisite form for the purpose, available at the Dean Office. A student will be permitted to register for a maximum of 3 courses. The registration fees shall be Rs. 20,000/- (Rs. Twenty Thousand) per course. The duly filled-in application form will have to be submitted by the due date stipulated by the Dean Office, along with the requisite tuition fees, to be paid latest by the due date stipulated. The total number of students who can register for a course will not be bound by any limit – except as per the discretion of the University.

Any applications received after the due date, or for which the stipulated fees are not paid by the due date, shall be rejected. A student can withdraw from summer semester within a week of its commencement on specific ground by making application to the Dean, Academic. However, fees once paid will not be refunded for withdrawing from the summer semester course (s).

Attendance, Examination and Evaluation:

- A student, who has registered in a course, will be required to have a minimum of 85% attendance, in order to qualify to appear in the Minor test as well as for the Major test.
- The maximum marks for all the components of the evaluation of a course i.e. the class tests, quizzes, online test, the Minor test, the Major test, the laboratory assignments evaluation, shall be the same as that in the approved curriculum.
- The Minor test shall be conducted in third week of the commencement of the semester. The exact dates for the same shall be declared by the Dean Office in separate Calendar.
- The cut-off marks for grades shall preferably be the same as set for regular examination for a course. However, the moderation committee shall review the cutoffs and may suggest suitable revisions.

10.   CGPA IMPROVEMENT

A policy on CGPA improvement scheme has been introduced for those students who after completing the requirements of their Programme; pass the Degree in second class (less than 6.0 CGPA) or miss their degrees (CGPA less than 4.5 for UG and 5.0 for PG programmes). The policy is prepared to help students missing First class or pass by a small margin. The following are the features of the NCU Policy.

i. A student who after completing all the requirements of a Programme passes the Degree in second class i.e. (CGPA less than 6.0) or misses the Degree i.e. (CGPA less than 4.5 for UG and 5.0 for PG programs) will have the option of improving the CGPA during immediate next one year, subject to duration of the program not exceeding the maximum duration prescribed for it as per NCU norms.

ii. A student will be required to submit a request for opting for CGPA improvement scheme to Dean Office immediately after the completion of the degree. Once the Degree certificate is issued, no such request will be acceptable under any circumstances.

iii. Under this scheme, a student will select a maximum of six courses from across semesters for which he/she may register in one of the following examination modes during immediate summer semester or in next two regular semesters:

    a. **Supplementary Mode:** In this mode, student will appear for Minor & Major Tests of the course. Here, Internal Marks (CIE Marks) in the course will remain same as those obtained earlier.

    b. **Regular Study Mode:** In this mode, student will require attending classes for the course, keeping attendance requirement intact. Here, student will require obtaining marks under all categories. A student can take few courses out of the selected courses in Supplementary Mode and others in Regular Study Mode as well. Option of "Regular Study Mode" for any course during summer semester is subject to availability of faculty resource. Also, this option (Regular Study Mode) will be available during regular semesters for those courses only which are already running in that semester.

    A student is also allowed to take additional courses related to the programme under this scheme, provided the same are running as regular courses for existing batches.

iv. The newly secured "Letter Grades" only will be recorded and taken into account for calculation of SGPA and CGPA for courses registered under "Regular Study Mode". However, for courses registered under "Supplementary Mode", the same will be done only if there is an improvement.

v. The final scored CGPA will be capped up to 6.00 under this scheme.

vi. Under this scheme, during summer semester, the University will charge Rs. 3,000/- per course for courses registered under "Supplementary Mode" and Rs. 20,000/- per course for courses registered under "Regular Study Mode".

vii. Under this scheme, during regular semesters, the university will charge Rs. 1,500/- per course for courses registered under "Supplementary Mode" and Rs. 10,000/- per course for courses registered under "Regular Study Mode".

viii. The student must carefully read the policy and make an assessment on his own whether after opting for Supplementary Mode or Regular Study Mode for the maximum number of courses permitted to appear; he/she is likely to achieve the desired objective.

11. PROGRAM/ BRANCH TRANSFER

11.1.   For engineering students:

B.Tech students can transfer from one branch to another after completing two semesters (one year). Student needs to apply to the Vice Chancellor for Branch change (through HoD). Permission to transfer branch is given only as per the rules and guidelines approved by Academic Council.

11.2   For Management, Law & Sciences students:

(a) The students of SOM, SOL, SOET (B.Sc. only) can transfer from one undergraduate program to other immediately after the first year. The inter and intra school migration is possible between various programs as bulk of the courses in UG programs of SOM, SOL, B.Sc. in SOET are common in first year. Student needs to apply to the Vice Chancellor for Program change (through HoD).

(b) The decision of the Vice Chancellor shall be final & binding for any case of branch/program transfer.

Department of Computer Science and Engineering & Information Technology

The Departments has earned a formidable reputation of providing an impeccable quality of education since 1996. The department provides adequate opportunities for student and researchers to learn and innovate and constantly modernizes the infrastructure and lab facilities through NCU as well as industry. The department has distinguished faculty, most of them holding M. Tech / PhD degree from renowned institutes in India and abroad.

Programmes offered by the Department:

1. Master of Technology in Computer Science & Engineering with specialization in:
   - Data Sciences
   - Cyber Security & Forensics

2. Bachelor of Technology in Computer Science & Engineering with specialization in:
   - Full Stack Development
   - Cyber Security & Forensics
   - Blockchain
   - Cloud Computing
   - Artificial Intelligence and Machine Learning
   - Data Science
   - Gaming, Augmented Reality and Virtual Reality

3. Bachelor of Computer Applications with specialization in:
   - Animation and Gaming
   - Web Application Development

Specializations in Computer Science & Engineering

Full Stack Development

"Coding is like writing, and we live in a time of the new industrial revolution. What's happened is that maybe everybody knows how to use computers, like they know how to read, but they don't know how to write."
said Susan Wojcicki, CEO of YouTube, clearly signifies that coding is one of the most valuable skills anyone can learn today.

B-Tech CSE with Full Stack specialization prepares the student to become an expert at Front-end and Back-end technologies by employing the most popular JAM (Java, Angular and MongoDB) Stack. Students will learn to create web applications from the ground-up with the right engineering disciplines and methodologies in a corporate aligned culture with detailed emphasis on Dev-Ops and Agile (SCRUM) principles.

Cyber Security & Forensics

"In Cyber security, the more systems we secure, the more secure we all are"
stated by Jed Johnson, Former United States Secretary of Homeland Security emphasize on securing the digital world.

B-Tech CSE with specialization in Cyber Security & Forensics equips students with the foundation concepts underlying the secure systems. The curriculum involves hands-on practice sessions to develop skills required for understanding vulnerabilities of existing systems and building systems that defend against escalating cyber threats.

Blockchain

Blockchain is becoming an inevitable phenomenon owing to the core-enabling technologies and significant opportunities it offers to digital businesses. With numerous businesses across various industry verticals adopting blockchain at a rapid pace, it is evident that blockchain is transforming into a movement and is steadily moving towards the next phase of the blockchain revolution.

B-Tech CSE with Blockchain specialization includes a blend of theoretical concepts and practical practice sessions to enable students understand and implement Blockchain based applications. The curriculum lays a strong mathematical foundation of Blockchain fundamentals covering the structure of Blockchain to designing of own Blockchain. The technologies like Big data. Cloud and Web development are also included with Blockchain's perspective.

Cloud Computing

"At this point, cloud adoption is mainstream, and Adoption of next-generation solutions are almost always 'cloud-enhanced' solutions"

as said by Sid Nag, research Vice President at Gartner, clearly signifies that all organizations would build on the strengths of a cloud platform to deliver digital business capabilities.

B.Tech. CSE with Cloud Computing specialization offers students with theory and practice to enable them to understand and implement cloud-based applications. The curriculum lays the foundation of cloud computing fundamentals covering all major service providers including Google cloud, AWS and Microsoft Azure.

Artificial Intelligence and Machine Learning

"Our intelligence is what makes us human, and AI is an extension of that quality."
– Yann LeCun Professor, New York University

B-Tech CSE with Artificial Intelligence and Machine Learning specialization offers students with theoretical and practical knowledge of computational tools that are the need of real world applications such as linguistics, health, bioinformatics, economics, education, social network analysis, games etc. The curriculum lays the foundation of Artificial Intelligence and Machine Learning fundamentals including Probability and Statistics, Tensorflow, Applied Artificial Intelligence, Natural Language Processing, Robotics, Computer Vision etc. Companies such as Google, IBM, Microsoft, and other leading players have actively implemented AI as a crucial part of their technologies.

Data Science

"We are drowning in information and starving for knowledge"— John Naisbitt

B-Tech CSE with Data Science specialization offers students with theory and practice to enable them to understand and implement business-based applications. The curriculum lays the foundation of data science fundamentals including Probability and Statistics, Data Engineering, Machine Learning, Google Cloud Platform, Tableau, Knime etc. With a focus towards the ability to unravel insights from shapeless data and convey their findings in a language that their business stakeholders can comprehend, data science experts are needed in virtually every job sector—not just in technology.

Game Tech, AR & VR

"You can push the bounds of your imagination and we have the resources tailored to bring your immersive vision to life"
– Unity

B-Tech CSE with Gaming AR, VR specialization offers students with in-depth knowledge which will   enable them to understand and industrial usability and implementation of Game technologies, Augmented and Virtual reality applications/simulations. This specialization gives an opportunity by working with these technologies and a focused degree with strong tech foundation, combining rigorous taught components with studio based learning and critical thinking.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
M.Tech. Computer Science and Engineering
(Specialization offered in Data Science and Cyber Security and Forensics)

Program Core

		L-T-P	C
CSL501	Mathematical Foundations of Computer Science	3-0-0	3
CSL535	Advanced Data Structure	3-0-2	4
CSL502	Advanced Algorithms	3-0-2	4
CSL515	Soft Computing	3-0-2	4

Basic Science Courses/Audit course

		L-T-P	C
MAL616	Research Methodology	2-1-0	3

Open Elective Courses

		L-T-P	C
	Open Elective – 1	2-0-2	3

*Open electives can be chosen from University list of Open Elective courses

Project & Dissertations

		L-T-P	C
CSC501	Seminar	0-0-4	2
CSD501	Minor Project	0-0-8	4
CSD601	Dissertation (Phase-1)	0-0-12	6
CSL602	Dissertation (Phase-2)	0-0-24	12

Program Electives (Cyber Security and Forensics)

		L-T-P	C
CSL537	Risk Management Principles and Policies	2-0-4	4
CSL544	Cyber Forensics & Malware Analysis Fundamentals	2-0-4	4
CSL546	Cloud and its Security	2-0-4	4
CSL547	Applied Cryptography	2-0-4	4
CSL548	Network Hacking & Security	2-0-4	4
CSL549	Secure coding vulnerabilities and mitigation	2-0-4	4
CSL565	Web Application Security	2-0-4	4
CSL566	Blockchain and Cryptocurrency	2-0-4	4
CSL567	Vulnerability Assessment and Penetration testing	2-0-4	4

Program Electives (Data Science)

		L-T-P	C
CSL551	Foundation of Data Science	2-0-4	4
CSL530	Statistics with Python	2-0-4	4
CSL556	Data Engineering	2-0-4	4
CSL561	Business Analytics	2-0-4	4
CSL555	Advanced Machine Learning	2-0-4	4
CSL545	Big Data Analytics	2-0-4	4
CSL558	Computer Vision	2-0-4	4
CSL559	Neural Networks and Deep Learning	2-0-4	4

PG Diploma (Specialization offered in Data Science and Cyber Security & Forensics)

Sem	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5	Subject 6	L	T	P	Weekly Contact Hours	Credits
I	CSL501 Mathematical Foundations of Computer Science 3-0-0 (3)	CSL535 Advanced Data Structure 3-0-2 (4)	PE-1 2-0-4 (4)	PE-2 2-0-4 (4)	CSC501 Seminar 0-0-4 (2)	CSS501 Community Service (CS)	10	0	14	24	17
II	CSL502 Advanced Algorithms 3-0-2 (4)	CSL515 Soft Computing 3-0-2 (4)	PE-3 2-0-4 (4)	PE-4 2-0-4 (4)	CSD501 Minor Project (5)	CSS502 Community Service (CS) (140Hrs** 2 Credits)	10	0	22	12	23
Summer	Skill based course (3)	Industrial Internship (7)					0	0	0	0	10
EXIT OPTION: PG DIPLOMA; CREDITS = 50											50

*PE – Programme Elective   * OE – Open Elective
**Students can utilize the summer/winter break period to complete the remaining 140 Community Service hours every year

M.Tech. Computer Science and Engineering (Full Time)
(Specialization offered in Data Science and Cyber Security and Forensics)

Sem	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5	Subject 6	L	T	P	Weekly Contact Hours	Credits
I	CSL501 Mathematical Foundations of Computer Science 3-0-0 (3)	CSL535 Advanced Data Structure 3-0-2 (4)	PE-1 2-0-4 (4)	PE-2 2-0-4 (4)	CSC501 Seminar 0-0-4 (2)	CSS501 Community Service (CS)	10	0	14	24	17
II	CSL502 Advanced Algorithms 3-0-2 (4)	CSL515 Soft Computing 3-0-2 (4)	PE-3 2-0-4 (4)	PE-4 2-0-4 (4)	CSD501 Minor Project (5)	CSS502 Community Service (CS) (140Hrs** 2 Credits)	10	0	22	12	23
III	OE 2-0-2 (3)	MAL616 Research Methodology 2-1-0 (3)	PE-5 2-0-4 (4)	CSD601 Dissertation-I 0-0-12 (6)		CSS601 Community Service (CS)	6	1	18	6	16
IV	CSD602 Dissertation-II 0-0-24 (12)		-	-	-	CSS602 Community Service (CS) (2)	0	0	24	--	14
TOTAL CREDITS OF THE M.TECH DEGREE PROGRAMME =											70

*PE – Programme Elective   * OE – Open Elective

**Students can utilize the summer/winter break period to complete the remaining 140 Community Service hours every year

M.Tech. Computer Science and Engineering (Part-Time)
(Specialization offered in Data Science and Cyber Security and Forensics)

Sem	Subject 1	Subject 2	Subject 3	Subject 4	L	T	P	Weekly Contact Hours	Credits
I	CSL501 Mathematical Foundations of Computer Science 3-0-0 (3)	CSL535 Advanced Data Structure 3-0-2 (4)	PE-1 2-0-4 (4)	CSS501 Community Service (CS)	8	0	6	14	11
II	CSL502 Advanced Algorithms 3-0-2 (4)	CSL515 Soft Computing 3-0-2 (4)	PE-2 2-0-4 (4)	CSS502 Community Service (CS) (140Hrs 2 Credits)	8	0	8	16	14
III	OE 2-0-2 (3)	MAL616 Research Methodology 2-1-0 (3)	PE-3 2-0-4 (4)	CSS601 Community Service (CS)	6	1	6	07	10
IV	PE-4 2-0-4 (4)	PE-5 2-0-4 (4)	CSD501 Minor Project (5)	CSS602 Community Service (CS) (140Hrs 2 Credits)	4	0	8	12	15
V	CSD601 Dissertation-I 0-0-12 (6)	CSC501 Seminar 0-0-4 (2)			0	0	16	--	8
VI	CSD602 Dissertation-II 0-0-24 (12)				0	0	24	--	12
TOTAL CREDITS OF THE M.TECH DEGREE PROGRAMME =									70

*PE – Programme Elective   * OE – Open Elective
**Students can utilize the summer/winter break period to complete the remaining 140 Community Service hours every year

Department of Computer Science and Engineering

Bachelor of Technology in Computer Science & Engineering with Specialization in Full Stack Development

Basic Science Courses   L-T-P   C

		L-T-P	C
MAL151	Engineering Maths -I	3-0-2	4
MAL152	Engineering Maths -II	3-0-2	4
PHY150	Engineering Physics	3-0-2	4
CHL150	Engineering Chemistry	2-0-2	3

Engineering Science Courses   L-T-P   C

		L-T-P	C
CSL106	FOCP I	2-0-4	4
CSL108	FOCP II	2-0-4	4
MEP110	Engineering Graphics & Drawing	1-0-4	3
MEL160	Basics of Mechanical Engineering	2-0-2	3
ECL 110	Basics of Electrical & Electronics Engineering	2-0-2	3
CSL110	Problem Solving and design thinking	2-0-2	3

Program Core   L-T-P   C

		L-T-P	C
CSL223	Discrete Mathematics	3-0-2	4
CSL209	Data Structures	3-0-2	4
CSL214	Database Management Systems	3-0-2	4
CSL203	Operating Systems	3-0-2	4
CSL229	Software Engineering and Project Management	3-0-2	4
CSL230	Analysis and Design of Algorithms	3-0-2	4
CSL240	Computer Networks	3-0-2	4
CSL318	Theory of Computation (MOOC)	3-0-2	4
ECL255	Digital Electronics and Computer Architectu	3-0-2	4
CSL422	Cyber Security	3-0-2	4
CSL236/ CSL242	Introduction to AI & ML / AI for Games	3-0-2	4
SEG400	Self Study Course GATE	Audit	

General Proficiency   C

		C
CSR118	General Proficiency-I	1
CSR119	General Proficiency -II	1
CSR218	General Proficiency -III	1
CSR219	General Proficiency -IV	1
CSR318	General Proficiency -V	1
CSR319	General Proficiency -VI	1

Program/Specialization Electives   L-T-P   C

		L-T-P	C
CSL273	Enterprise Web Applications	2-0-4	4
CSL274	Middleware Frameworks and ORM	2-0-4	4
CSL276	NoSQL	2-0-4	4
CSL253	Web Frameworks	2-0-4	4
CSL371	Mobile Application Development	2-0-4	4
CSL373	DevOps	2-0-4	4
CSL311	Big Data	2-0-4	4
CSL374	Microservice Based Application	2-0-4	4

Humanities and Management Courses   L-T-P   C

		L-T-P	C
CLL101	Effective Communications I	2-1-0	2.5
CLL102	Effective Communications II	2-1-0	2.5
SML300	Entrepreneurship	3-0-0	3

University-Wide Compulsory Courses   L-T-P   C

		L-T-P	C
CHL100	Environmental Studies	3-0-0	3
CLL120	Human Values and Professional Ethics	2-0-0	2
CLP300	Campus to Corporate	1-0-0	1

Other Mandatory Courses   L-T-P   C

	L-T-P	C
Open Elective – 1	3-0-0	3
Open Elective – 2	3-0-0	3
Open Elective – 3	3-0-0	3
Open Elective – 4	3-0-0	3
Open Elective – 5	3-0-0	3
Foreign Language Elective	3-0-0	3
Liberal Arts Course	3-0-0	3

Project & Internship (P)   L-T-P   C

		L-T-P	C
CSD401	Project – I		4
CSD402	Project – II/ Internship		6
CSV201	Skill Development	1-0-2	2
CSC301	Seminar		1
CST201	Practical Training		2
CST301	Industrial Internship		3

- Upto 20% of courses can be done through MOOC courses subject to department approval
- Open electives, Foreign Elective and Liberal Art Courses can be chosen from University list of Open Elective courses
- Minimum six program electives for certification in specialization

Department of Computer Science and Engineering

Bachelor of Technology in Computer Science & Engineering with Specialization in Cyber Security & Forensic

Basic Science Courses

		L-T-P	C
MAL151	Engineering Maths -I	3-0-2	4
MAL152	Engineering Maths -II	3-0-2	4
PHY150	Engineering Physics	3-0-2	4
CHL150	Engineering Chemistry	2-0-2	3

Engineering Science Courses

		L-T-P	C
CSL106	FOCP I	2-0-4	4
CSL108	FOCP II	2-0-4	4
MEP110	Engineering Graphics & Drawing	1-0-4	3
MEL160	Basics of Mechanical Engineering	2-0-2	3
ECL 110	Basics of Electrical & Electronics Engineering	2-0-2	3
CSL110	Problem Solving and design thinking	2-0-2	3

Program Core

		L-T-P	C
CSL223	Discrete Mathematics	3-0-2	4
CSL209	Data Structures	3-0-2	4
CSL214	Database Management Systems	3-0-2	4
CSL203	Operating Systems	3-0-2	4
CSL229	Software Engineering and Project Management	3-0-2	4
CSL230	Analysis and Design of Algorithms	3-0-2	4
CSL240	Computer Networks	3-0-2	4
CSL318	Theory of Computation (MOOC)	3-0-2	4
ECL255	Digital Electronics and Computer Architectu	3-0-2	4
CSL422	Cyber Security	3-0-2	4
CSL236/ CSL242	Introduction to AI & ML / AI for Games	3-0-2	4
SEG400	Self Study Course GATE	Audit	

General Proficiency

		C
CSR118	General Proficiency-I	1
CSR119	General Proficiency -II	1
CSR218	General Proficiency -III	1
CSR219	General Proficiency -IV	1
CSR318	General Proficiency -V	1
CSR319	General Proficiency -VI	1

Program/Specialization Electives

		L-T-P	C
CSL281	Secure Communication and Cryptography	2-0-4	4
CSL283	Secure Coding and Vulnerabilities	2-0-4	4
CSL284	Digital Forensics and Malware Analysis	2-0-4	4
CSL383	Network Security	2-0-4	4
CSL387	Web and Mobile Security	2-0-4	4
CSL384	Cloud Security Essentials	2-0-4	4
CSL385	Risk Analysis & Assessment	2-0-4	4
CSL382	Blockchain	2-0-4	4

Humanities and Management Courses

		L-T-P	C
CLL101	Effective Communications I	2-1-0	2.5
CLL102	Effective Communications II	2-1-0	2.5
SML300	Entrepreneurship	3-0-0	3

University-Wide Compulsory Courses

		L-T-P	C
CHL100	Environmental Studies	3-0-0	3
CLL120	Human Values and Professional Ethics	2-0-0	2
CLP300	Campus to Corporate	1-0-0	1

Other Mandatory Courses

	L-T-P	C
Open Elective – 1	3-0-0	3
Open Elective – 2	3-0-0	3
Open Elective – 3	3-0-0	3
Open Elective – 4	3-0-0	3
Open Elective – 5	3-0-0	3
Foreign Language Elective	3-0-0	3
Liberal Arts Course	3-0-0	3

Project & Internship (P)

		L-T-P	C
CSD401	Project – I		4
CSD402	Project – II/ Internship		6
CSV201	Skill Development	1-0-2	2
CSC301	Seminar		1
CST201	Practical Training		2
CST301	Industrial Internship		3

- Upto 20% of courses can be done through MOOC courses subject to department approval
- Open electives, Foreign Elective and Liberal Art Courses can be chosen from University list of Open Elective courses
- Minimum six program electives for certification in specialization.

Department of Computer Science and Engineering

Bachelor of Technology in Computer Science & Engineering with Specialization in Blockchain

Basic Science Courses

		L-T-P	C
MAL151	Engineering Maths -I	3-0-2	4
MAL152	Engineering Maths -II	3-0-2	4
PHY150	Engineering Physics	3-0-2	4
CHL150	Engineering Chemistry	2-0-2	3

Engineering Science Courses

		L-T-P	C
CSL106	FOCP I	2-0-4	4
CSL108	FOCP II	2-0-4	4
MEP110	Engineering Graphics & Drawing	1-0-4	3
MEL160	Basics of Mechanical Engineering	2-0-2	3
ECL 110	Basics of Electrical & Electronics Engineering	2-0-2	3
CSL110	Problem Solving and design thinking	2-0-2	3

Program Core

		L-T-P	C
CSL223	Discrete Mathematics	3-0-2	4
CSL209	Data Structures	3-0-2	4
CSL214	Database Management Systems	3-0-2	4
CSL203	Operating Systems	3-0-2	4
CSL229	Software Engineering and Project Management	3-0-2	4
CSL230	Analysis and Design of Algorithms	3-0-2	4
CSL240	Computer Networks	3-0-2	4
CSL318	Theory of Computation (MOOC)	3-0-2	4
ECL255	Digital Electronics and Computer Architectu	3-0-2	4
CSL422	Cyber Security	3-0-2	4
CSL236/ CSL242	Introduction to AI & ML / AI for Games	3-0-2	4
SEG400	Self Study Course GATE	Audit	

General Proficiency

		C
CSR118	General Proficiency-I	1
CSR119	General Proficiency -II	1
CSR218	General Proficiency -III	1
CSR219	General Proficiency -IV	1
CSR318	General Proficiency -V	1
CSR319	General Proficiency -VI	1

Program/Specialization Electives

		L-T-P	C
CSL239	Mathematics of Modern Cryptography	2-0-4	4
CSL247	Introduction to blockchain technologies	2-0-4	4
CSL355	Bitcoin and Cryptocurrency Technologies	2-0-4	4
CSL356	Smart Contracts	2-0-4	4
CSL357	Blockchain for Cyber Security	2-0-4	4
CSL358	Blockchain Technology in Web Development	2-0-4	4
CSL449	Security and Privacy for Big Data Analytics	2-0-4	4
CSL455	Cloud Infrastructure and Services	2-0-4	4

Humanities and Management Courses

		L-T-P	C
CLL101	Effective Communications I	2-1-0	2.5
CLL102	Effective Communications II	2-1-0	2.5
SML300	Entrepreneurship	3-0-0	3

University-Wide Compulsory Courses

		L-T-P	C
CHL100	Environmental Studies	3-0-0	3
CLL120	Human Values and Professional Ethics	2-0-0	2
CLP300	Campus to Corporate	1-0-0	1

Other Mandatory Courses

		L-T-P	C
	Open Elective – 1	3-0-0	3
	Open Elective – 2	3-0-0	3
	Open Elective – 3	3-0-0	3
	Open Elective – 4	3-0-0	3
	Open Elective – 5	3-0-0	3
	Foreign Language Elective	3-0-0	3
	Liberal Arts Course	3-0-0	3

Project & Internship (P)

		L-T-P	C
CSD401	Project – I		4
CSD402	Project – II/ Internship		6
CSV201	Skill Development	1-0-2	2
CSC301	Seminar		1
CST201	Practical Training		2
CST301	Industrial Internship		3

- Upto 20% of courses can be done through MOOC courses subject to department approval
- Open electives, Foreign Elective and Liberal Art Courses can be chosen from University list of Open Elective courses
- Minimum six program electives for certification in specialization.

Department of Computer Science and Engineering

Bachelor of Technology in Computer Science & Engineering with Specialization in Cloud Computing

Basic Science Courses   **L-T-P**   **C**

		L-T-P	C
MAL151	Engineering Maths -I	3-0-2	4
MAL152	Engineering Maths -II	3-0-2	4
PHY150	Engineering Physics	3-0-2	4
CHL150	Engineering Chemistry	2-0-2	3

Engineering Science Courses   **L-T-P**   **C**

		L-T-P	C
CSL106	FOCP I	2-0-4	4
CSL108	FOCP II	2-0-4	4
MEP110	Engineering Graphics & Drawing	1-0-4	3
MEL160	Basics of Mechanical Engineering	2-0-2	3
ECL 110	Basics of Electrical & Electronics Engineering	2-0-2	3
CSL110	Problem Solving and design thinking	2-0-2	3

Program Core   **L-T-P**   **C**

		L-T-P	C
CSL223	Discrete Mathematics	3-0-2	4
CSL209	Data Structures	3-0-2	4
CSL214	Database Management Systems	3-0-2	4
CSL203	Operating Systems	3-0-2	4
CSL229	Software Engineering and Project Management	3-0-2	4
CSL230	Analysis and Design of Algorithms	3-0-2	4
CSL240	Computer Networks	3-0-2	4
CSL318	Theory of Computation (MOOC)	3-0-2	4
ECL255	Digital Electronics and Computer Architectu	3-0-2	4
CSL422	Cyber Security	3-0-2	4
CSL236/ CSL242	Introduction to AI & ML / AI for Games	3-0-2	4
SEG400	Self Study Course GATE	Audit	

General Proficiency   **C**

		C
CSR118	General Proficiency-I	1
CSR119	General Proficiency -II	1
CSR218	General Proficiency -III	1
CSR219	General Proficiency -IV	1
CSR318	General Proficiency -V	1
CSR319	General Proficiency -VI	1

Program/Specialization Electives   **L-T-P**   **C**

		L-T-P	C
CSL225	Programming for Data Science	2-0-4	4
CSL238	Introduction to Cloud Computing	2-0-4	4
CSL337	Cloud Architecture	2-0-4	4
CSL338	Virtualization & Cloud Computing	2-0-4	4
CSL339	Big Data on Cloud	2-0-4	4
CSL346	Artificial Intelligence & Machine Learning on Cloud	2-0-4	4
CSL445	Cloud Application Development & Deployment	2-0-4	4
CSL446	Cloud Security	2-0-4	4

Humanities and Management Courses   **L-T-P**   **C**

		L-T-P	C
CLL101	Effective Communications I	2-1-0	2.5
CLL102	Effective Communications II	2-1-0	2.5
SML300	Entrepreneurship	3-0-0	3

University-Wide Compulsory Courses   **L-T-P**   **C**

		L-T-P	C
CHL100	Environmental Studies	3-0-0	3
CLL120	Human Values and Professional Ethics	2-0-0	2
CLP300	Campus to Corporate	1-0-0	1

Other Mandatory Courses   **L-T-P**   **C**

	L-T-P	C
Open Elective – 1	3-0-0	3
Open Elective – 2	3-0-0	3
Open Elective – 3	3-0-0	3
Open Elective – 4	3-0-0	3
Open Elective – 5	3-0-0	3
Foreign Language Elective	3-0-0	3
Liberal Arts Course	3-0-0	3

Project & Internship (P)   **L-T-P**   **C**

		L-T-P	C
CSD401	Project – I		4
CSD402	Project – II/ Internship		6
CSV201	Skill Development	1-0-2	2
CSC301	Seminar		1
CST201	Practical Training		2
CST301	Industrial Internship		3

- Upto 20% of courses can be done through MOOC courses subject to department approval
- Open electives, Foreign Elective and Liberal Art Courses can be chosen from University list of Open Elective courses
- Minimum six program electives for certification in specialization.

Department of Computer Science and Engineering

Bachelor of Technology in Computer Science & Engineering with Specialization in Artificial Intelligence and Machine Learning

Basic Science Courses

		L-T-P	C
MAL151	Engineering Maths -I	3-0-2	4
MAL152	Engineering Maths -II	3-0-2	4
PHY150	Engineering Physics	3-0-2	4
CHL150	Engineering Chemistry	2-0-2	3

Engineering Science Courses

		L-T-P	C
CSL106	FOCP I	2-0-4	4
CSL108	FOCP II	2-0-4	4
MEP110	Engineering Graphics & Drawing	1-0-4	3
MEL160	Basics of Mechanical Engineering	2-0-2	3
ECL 110	Basics of Electrical & Electronics Engineering	2-0-2	3
CSL110	Problem Solving and design thinking	2-0-2	3

Program Core

		L-T-P	C
CSL223	Discrete Mathematics	3-0-2	4
CSL209	Data Structures	3-0-2	4
CSL214	Database Management Systems	3-0-2	4
CSL203	Operating Systems	3-0-2	4
CSL229	Software Engineering and Project Management	3-0-2	4
CSL230	Analysis and Design of Algorithms	3-0-2	4
CSL240	Computer Networks	3-0-2	4
CSL318	Theory of Computation (MOOC)	3-0-2	4
ECL255	Digital Electronics and Computer Architectu	3-0-2	4
CSL422	Cyber Security	3-0-2	4
CSL236/ CSL242	Introduction to AI & ML / AI for Games	3-0-2	4
SEG400	Self Study Course GATE	Audit	

General Proficiency

		C
CSR118	General Proficiency-I	1
CSR119	General Proficiency -II	1
CSR218	General Proficiency -III	1
CSR219	General Proficiency -IV	1
CSR318	General Proficiency -V	1
CSR319	General Proficiency -VI	1

Program/Specialization Electives

		L-T-P	C
CSL 225	Programming for Data Science and AI	2-0-4	4
CSL227	Applied Computational Statistics	2-0-4	4
CSL347	Applied Artificial Intelligence and Expert Systems	2-0-4	4
CSL348	Reinforcement Learning	2-0-4	4
CSL349	Artificial Intelligence for Robotics	2-0-4	4
CSL312	Deep Learning	2-0-4	4
CSL447	Computer Vision	2-0-4	4
CSL448	Computational Linguistics and Natural Language Processing	2-0-4	4

Humanities and Management Courses

		L-T-P	C
CLL101	Effective Communications I	2-1-0	2.5
CLL102	Effective Communications II	2-1-0	2.5
SML300	Entrepreneurship	3-0-0	3

University-Wide Compulsory Courses

		L-T-P	C
CHL100	Environmental Studies	3-0-0	3
CLL120	Human Values and Professional Ethics	2-0-0	2
CLP300	Campus to Corporate	1-0-0	1

Other Mandatory Courses

	L-T-P	C
Open Elective – 1	3-0-0	3
Open Elective – 2	3-0-0	3
Open Elective – 3	3-0-0	3
Open Elective – 4	3-0-0	3
Open Elective – 5	3-0-0	3
Foreign Language Elective	3-0-0	3
Liberal Arts Course	3-0-0	3

Project & Internship (P)

		L-T-P	C
CSD401	Project – I		4
CSD402	Project – II/ Internship		6
CSV201	Skill Development	1-0-2	2
CSC301	Seminar		1
CST201	Practical Training		2
CST301	Industrial Internship		3

- **Upto 20% of courses can be done through MOOC courses subject to department approval**
- **Open electives, Foreign Elective and Liberal Art Courses can be chosen from University list of Open Elective courses**
- **Minimum six program electives for certification in specialization.**

Department of Computer Science and Engineering

Bachelor of Technology in Computer Science & Engineering with Specialization in Data Science

Basic Science Courses

		L-T-P	C
MAL151	Engineering Maths -I	3-0-2	4
MAL152	Engineering Maths -II	3-0-2	4
PHY150	Engineering Physics	3-0-2	4
CHL150	Engineering Chemistry	2-0-2	3

Engineering Science Courses

		L-T-P	C
CSL106	FOCP I	2-0-4	4
CSL108	FOCP II	2-0-4	4
MEP110	Engineering Graphics & Drawing	1-0-4	3
MEL160	Basics of Mechanical Engineering	2-0-2	3
ECL 110	Basics of Electrical & Electronics Engineering	2-0-2	3
CSL110	Problem Solving and design thinking	2-0-2	3

Program Core

		L-T-P	C
CSL223	Discrete Mathematics	3-0-2	4
CSL209	Data Structures	3-0-2	4
CSL214	Database Management Systems	3-0-2	4
CSL203	Operating Systems	3-0-2	4
CSL229	Software Engineering and Project Management	3-0-2	4
CSL230	Analysis and Design of Algorithms	3-0-2	4
CSL240	Computer Networks	3-0-2	4
CSL318	Theory of Computation (MOOC)	3-0-2	4
ECL255	Digital Electronics and Computer Architectu	3-0-2	4
CSL422	Cyber Security	3-0-2	4
CSL236/ CSL242	Introduction to AI & ML / AI for Games	3-0-2	4
SEG400	Self Study Course GATE	Audit	

General Proficiency

		C
CSR118	General Proficiency-I	1
CSR119	General Proficiency -II	1
CSR218	General Proficiency -III	1
CSR219	General Proficiency -IV	1
CSR318	General Proficiency -V	1
CSR319	General Proficiency -VI	1

Program/Specialization Electives

		L-T-P	C
CSL225	Programming for Data Science	2-0-4	4
CSL227	Applied Computational Statistics	2-0-4	4
CSL232	Business Intelligence & Data Visualization	2-0-4	4
CSL234	Data Engineering	2-0-4	4
CSL313	Machine Learning	2-0-4	4
CSL311	Big Data	2-0-4	4
CSL316	Introduction to Image Processing and Recognition	2-0-4	4
CSL312	Deep Learning	2-0-4	4

Humanities and Management Courses

		L-T-P	C
CLL101	Effective Communications I	2-1-0	2.5
CLL102	Effective Communications II	2-1-0	2.5
SML300	Entrepreneurship	3-0-0	3

University-Wide Compulsory Courses

		L-T-P	C
CHL100	Environmental Studies	3-0-0	3
CLL120	Human Values and Professional Ethics	2-0-0	2
CLP300	Campus to Corporate	1-0-0	1

Other Mandatory Courses

	L-T-P	C
Open Elective – 1	3-0-0	3
Open Elective – 2	3-0-0	3
Open Elective – 3	3-0-0	3
Open Elective – 4	3-0-0	3
Open Elective – 5	3-0-0	3
Foreign Language Elective	3-0-0	3
Liberal Arts Course	3-0-0	3

Project & Internship (P)

		L-T-P	C
CSD401	Project – I		4
CSD402	Project – II/ Internship		6
CSV201	Skill Development	1-0-2	2
CSC301	Seminar		1
CST201	Practical Training		2
CST301	Industrial Internship		3

- **Upto 20% of courses can be done through MOOC courses subject to department approval**
- **Open electives, Foreign Elective and Liberal Art Courses can be chosen from University list of Open Elective courses**
- **Minimum six program electives for certification in specialization.**

Department of Computer Science and Engineering

Bachelor of Technology in Computer Science & Engineering with Specialization in Gaming, AR & VR

Basic Science Courses

		L-T-P	C
MAL151	Engineering Maths -I	3-0-2	4
MAL152	Engineering Maths -II	3-0-2	4
PHY150	Engineering Physics	3-0-2	4
CHL150	Engineering Chemistry	2-0-2	3

Engineering Science Courses — L-T-P   C

		L-T-P	C
CSL106	FOCP I	2-0-4	4
CSL108	FOCP II	2-0-4	4
MEP110	Engineering Graphics & Drawing	1-0-4	3
MEL160	Basics of Mechanical Engineering	2-0-2	3
ECL 110	Basics of Electrical & Electronics Engineering	2-0-2	3
CSL110	Problem Solving and design thinking	2-0-2	3

Program Core — L-T-P   C

		L-T-P	C
CSL223	Discrete Mathematics	3-0-2	4
CSL209	Data Structures	3-0-2	4
CSL214	Database Management Systems	3-0-2	4
CSL203	Operating Systems	3-0-2	4
CSL229	Software Engineering and Project Management	3-0-2	4
CSL230	Analysis and Design of Algorithms	3-0-2	4
CSL240	Computer Networks	3-0-2	4
CSL318	Theory of Computation (MOOC)	3-0-2	4
ECL255	Digital Electronics and Computer Architectu	3-0-2	4
CSL422	Cyber Security	3-0-2	4
CSL236/ CSL242	Introduction to AI & ML / AI for Games	3-0-2	4
SEG400	Self Study Course GATE	Audit	

General Proficiency

		C
CSR118	General Proficiency-I	1
CSR119	General Proficiency -II	1
CSR218	General Proficiency -III	1
CSR219	General Proficiency -IV	1
CSR318	General Proficiency -V	1
CSR319	General Proficiency -VI	1

Program/Specialization Electives

		L-T-P	C
CSL243	Game Design and Asset Creation	2-0-4	4
CSL245	Programming for Games	2-0-4	4
CSL244	Advanced Programming for Games	2-0-4	4
CSL343	Designing Human Computer Interfaces	2-0-4	4
CSL246	Cross Platform Game Development	2-0-4	4
CSL341	AR Development	2-0-4	4
CSL345	VR Development	2-0-4	4
CSL342	XR Studio	2-0-4	4

Humanities and Management Courses — L-T-P C

		L-T-P	C
CLL101	Effective Communications I	2-1-0	2.5
CLL102	Effective Communications II	2-1-0	2.5
SML300	Entrepreneurship	3-0-0	3

University-Wide Compulsory Courses — L-T-P C

		L-T-P	C
CHL100	Environmental Studies	3-0-0	3
CLL120	Human Values and Professional Ethics	2-0-0	2
CLP300	Campus to Corporate	1-0-0	1

Other Mandatory Courses — L-T-P   C

		L-T-P	C
	Open Elective – 1	3-0-0	3
	Open Elective – 2	3-0-0	3
	Open Elective – 3	3-0-0	3
	Open Elective – 4	3-0-0	3
	Open Elective – 5	3-0-0	3
	Foreign Language Elective	3-0-0	3
	Liberal Arts Course	3-0-0	3

Project & Internship (P) — L-T-P   C

		L-T-P	C
CSD401	Project – I		4
CSD402	Project – II/ Internship		6
CSV201	Skill Development	1-0-2	2
CSC301	Seminar		1
CST201	Practical Training		2
CST301	Industrial Internship		3

- Upto 20% of courses can be done through MOOC courses subject to department approval
- Open electives, Foreign Elective and Liberal Art Courses can be chosen from University list of Open Elective courses
- Minimum six program electives for certification in specialization.

Bachelor of Technology in 'Computer Science and Engineering- (2022-23)

Sem	Semester Course Code, Course Name (L-T-P)Credits						GP	Community Services	Hrs. Per week			Credits
									L	T	P	
1	MAL151 Engg Maths-I (3-0-2)4	CSL106 FOCP-I (2-0-4)4	CHL150 Engg Chemistry (2-0-2)3	CLL101 Effective Communication-I (2-1-0)2.5	MEP110 Engineering Graphics & Drawing (1-0-4)3	CSL110 Problem Solving and Design Thinking (2-0-2)3		CSR118 GP 1 Credit	CSS101 CS-I	12	1	14	19.5+1 =20.5
2	MAL152 Engg Maths-II (3-0-2)4	CSL108 FOCP-II (2-0-4)4	PYL150 Engineering Physics (3-0-2)4	CLL102 Effective Communication-II (2-1-0)2.5	MEL160 Basic of Mechanical Engg. (2-0-2)3	ECL110 Basic of Electrical & Electronics Engineering (2-0-2)3		CSR119 GP 1 Credit	CSS102 CS-II (140 Hrs)** 2 Credits	14	1	12	20.5+3 =23.5
Summer													
3	CSL209 Data Structures (3-0-2)4	ECL255 DE & CA (3-0-2)4	CSL240 Computer Networks (3-0-2)4	CSL223 Discrete Mathematics (3-0-0)3	Program Elective - I (2-0-4)4	CSV201 Skill Development* (1-0-2)2		CSR218 GP 1 Credit	CSS201 CS-III	15		12	21+1 =22
4	CSL422 Cyber Security (3-0-2)4	CSL214 DBMS (3-0-2)4	CSL230 Analysis and Design of Algorithms (3-0-2)4	Program Elective-2 (2-0-4)4	SML300 Entrepreneurship (3-0-0)3	Open Elective – 1 (MOOC) (3-0-0)3		CSR219GP 1 Credit	CSS202 CS-IV (140 Hrs)** 2 Credits	17		10	22+3 =25
Summer	CST201 Industrial Training/internship											2
5	CSL236 Introduction to AI & ML / CSL242 AI for Games (3-0-2)4	CSL303 Operating System (3-0-2)4	Program Elective-3 (2-0-4)4	Program Elective-4 (2-0-4)4	Open Elective – 2 (MOOC) (3-0-0)3	CLL120 HVPE (2-0-0-)2		CSR318 GP 1 Credit	CSS301 CS-V	15		12	21+1 =22
6	CSL229 SEPM (3-0-2)4	Program Elective-5 (2-0-4)4	Program Elective-6 (2-0-4)4	CSL318 Theory of Computation (3-0-2)4	Open Elective-3 (3-0-0)3	CLP300 Campus to Corporate (1-0-0)1	CSC301 Seminar 1 Credit	CSR319 GP 1 Credit	CSS302 CS-VI (140 Hrs)** 2 Credits	14		12	21+3 =24
Summer	CST301 Industrial Training											03
7	Program Elective-7 (2-0-4)4	Program Elective-8 (2-0-4)4	CSD401 Project # 1 4 Credits	Open Elective – 4 (MOOC) (3-0-0)3	CHL100 EVS (3-0-0)3	Foreign Language (3-0-0)3			CSS401 CS-VII	13		8	21
8	SML170 Liberal Arts (3-0-0-)3	Open Elective – 5 (MOOC) (3-0-0)3	CSD402 Project # 2 /Internship 6 Credits						CSS402 CS-VIII (140 Hrs) 2 Credits	6			12+2 =14
Total									106	2	80	**163+14= 177**

* CSV201 Skill Development (Python to be taught to students with Cyber Security specialization)
** Students can utilize the summer/winter break period to complete the remaining 140 Community Service hours every year.

Program Electives for each track

Tracks	Data Science	Cloud Computing	Full Stack	Game Tech	Cyber Security	Blockchain	AI & ML	Other Electives
Program Elective-1	CSL 225 Programming for Data Science	CSL225 Programming for Data Science	CSL273 Enterprise Web Applications	CSL243 Game Design & Asset Creation	CSL 281 Secure Communication and Cryptography	CSL239 Mathematics of Modern Cryptography	CSL 225 Programming for Data Science and AI	MAL270 Numerical Methods
Program Elective-2	CSL227 Applied Computational Statistics	CSL238 Introduction to Cloud Computing	CSL274 Middleware Frameworks and ORM	CSL245 Programing for Games	CSL 283 Secure Coding and Vulnerabilities	CSL247 Intro. to blockchain technologies	CSL227 Applied Computational Statistics	CSL223 Web Development Technologies
Program Elective-3	CSL234 Data Engineering	CSL337 Cloud Architecture	CSL276 No SQL Databases	CSL244 Advanced Programming for Games	CSL 284 Digital Forensics and Malware Analysis	CSL355 Bitcoin and Cryptocurrency Technologies	CSL347 Applied Artificial Intelligence and Expert Systems	MAL280 Linear Algebra and its Applications
Program Elective-4	CSL232 Business Intelligence and Data Visualization	CSL338 Virtualization & Cloud Computing	CSL253 Web Frameworks	CSL343 Designing Human Computer Interfaces	CSL 383 Network security	CSL356 Smart Contracts	CSL348 Reinforcement Learning	MAL260 Probability and Statistics
Program Elective-5	CSL313 Machine Learning	CSL339 Big Data on Cloud	CSL371 Mobile Application Development	CSL246 Cross Platform Game Development	CSL387 Web and Mobile Security	CSL357 Blockchain for Cyber Security	CSL349 Artificial Intelligence for Robotics	
Program Elective-6	CSL311 Big Data	CSL346 Artificial Intelligence & Machine Learning on Cloud	CSL373 Devops	CSL341 AR Development	CSL385 Risk Analysis and Assessment	CSL358 Blockchain Technology in Web Development	CSL312 Deep Learning	
Program Elective-7	CSL316 Introduction to Image Processing and Recognition	CSL445 Cloud Application Development & Deployment	CSL311 Big Data	CSL345 VR Development	CSL384 Cloud Security Essentials	CSL449 Security and Privacy for Big Data Analytics	CSL447 Computer Vision	
Program Elective-8	CSL312 Deep Learning	CSL446 Cloud Security	CSL374 Micro service Based Applications	CSL342 XR Studio	CSL382 Blockchain	CSL455 Cloud Infrastructure and Services	CSL448 Computational Linguistics and Natural Language Processing	

The overall credits structure of BCA

Credits Structure			
Category		Credits	Total Credits
Programme Core (PC) + Compulsory Courses		66	66
Electives	Programme Electives (PE)	16	28
	Open Electives (OE)	12	
Ability Enhancement Courses (AEC)		3	16
Skill Enhancement		2	4
Industry Internship + Project		15	15
	TOTAL	129	129

A.   Programme Core (PC) + Compulsory Courses

S N	Code	Course Name	L-T-P	Credits
1.	MAL153	Mathematics -1	3-1-0	4
2.	BCL103	Programming Fundamentals – I	2-0-4	4
3.	BCL105	Programming Fundamentals – II	2-0-4	4
4.	MAL304N	Probability and Statistics	3-1-0	4
5.	BCL201	Data Structures	3-0-2	4
6.	BCL202	Computer Networks	3-0-2	4
7.	BCL203	DBMS	3-0-2	4
8.	BCL204	Operating Systems	3-0-2	4
9.	BCL205	Digital Electronics & Computer Architecture	3-0-2	4
10.	BCL206	Analysis and Design of Algorithms	3-0-2	4
11.	BCL303	Introduction to AI and ML	3-0-2	4
12.	BCL305	Software Engineering	3-0-2	4
13.	BCL110	Problem Solving and Design thinking	2-0-2	3
14.	BSL101	Entrepreneurship	2-0-2	3
15.	BCL102	Principles of Management	2-0-2	3
16.	PCL102	Phycology for living	2-0-4	4
17.	CLL102	Effective Communication – I	2-1-0	2.5
18.	CLL101	Effective Communication – II	2-1-0	2.5
		Total Credits		**66**

B.   Programme Electives (PE)

S. No.	Code	Course Name	L-T-P	Credits
PE-I				
BCA with Specialization in Animation and Gaming				
1	BCL211	Game Art Essentials	2-0-4	4
2	BCL222	Fundamentals of Web application development	2-0-4	4
3	BCL311	Basics of 3D Animation	2-0-4	4
4	BCL312	Foundations of 2D Game Development	2-0-4	4
BCA with Specialization in Web Application Development				
1	BCL221	UI / UX Design principles	2-0-4	4
2	BCL222	Fundamentals of Web application development	2-0-4	4
3	BCL321	Fundamentals of Mobile application development	2-0-4	4
4	BCL322	Software prototyping, usability & testing	2-0-4	4
Foreign Language and open Electives				
11	CLL220	German – I	1-2-0	3
12	CLL200	French – I	1-2-0	3
13	CLL270	Spanish – I	1-2-0	3
		Open Elective -1	3-0-0	3
		Open Elective -2	3-0-0	3
		Open Elective -3	3-0-0	3

C.   Ability Enhancement Courses (AEC)

S. No.	Code	Course Name	L-T-P	Credits
1	ASL140	Environmental Studies	3-0-0	3
2	CLL120	Human Values and Ethics	3-0-0	3
3	BCR118 BCR119 BCR218 BCR219 BCR318 BCR319	GP – 1 GP – 2 GP – 3 GP – 4 GP – 5 GP – 6		6
4	BCS101 BCS102 BCS201 BCS202 BCS301 BCS302	Community Service		5
		Total Credits		17

D. Skill Enhancement

S. No.	Code	Course Name	L-T-P	Credits
1.	BCV201	Skill Deveoplement-1	1-0-2	2
2.	BCV301	Skill Development-2	1-0-2	2
3.	BCD301	Project – 1	0-0-8	4
4.	BCD302	Project – 2	0-0-12	6
5.	BCT201	Summer Internship – I	--	2
6.	BCT301	Summer Internship - II	--	3
		Total Credits		**19**

Outline of Choice based credit system (CBCS):

1 **Programme Core:** A course, which should compulsorily be studied by a student as a core requirement is termed as a programme core course.

2 **Programme Elective:** Elective courses may be offered by the main discipline/subject of study is referred to as Programme Elective. The University may also offer Programme related elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).

3 **Generic (or Open) Elective:** An elective course generally chosen from an unrelated discipline/subject, with an intension to seek exposure is called a Generic (or Open) Elective.

4 **Ability Enhancement Courses (AEC):** These are the courses based upon the content that leads to knowledge enhancement. They are English/Communication courses.

5 **Skill Enhancement/Project/Dissertation:** The Project work/ Dissertation based on application of Mathematics, Computer applications, Research project and new innovative ideas.

Bachelor of Computer Applications - (2022-2023)

Sem.	Semester Course Code, Course Name (L-T-P) Credits						Community Service	GP	Hrs. Per week			Credits
									L	T	P	
1	MAL153 Mathematics-I (3-1-0)4	CLL101 Effective Communication -I (2-0-1)2.5	BCL103 Programming Fundamentals -I (2-0-4)4	BSL102 Principles of Management (2-0-2)3	CLL120 Human Values & Professional Ethics (2-0-0-)2		BCS101 CS-I	BCR118 GP – 1 (1-0-0-) 1 Credit	12	1	7	**16.5**
2	MAL112 Basics of Statistics (3-1-0)4	CLL102 Effective Communication -II (2-0-1)2.5	CHL100 Environmental Studies (3-0-0-)3	BCL104 Programming Fundamentals-II (2-0-4)4	BCL110 Problem Solving and Design Thinking (2-0-2)3	Foreign Language Elective 1 (1-2-0)3	BCS102 CS-II (140Hrs)* 2 Credit	BCR119 GP- 2 (1-0-0-) 1 Credit	14	3	7	**22.5**
	BCT201 Summer Training - I											2
3	BCL201 Data Structures (3-0-2)4	BCL203 DBMS (3-0-2)4	PCL102 Psychology for living (2-1-0)3	BCL205 Digital Electronics & Computer Architecture (3-0-2)4	Open Elective – 1 (3-0-0)3	Program Elective-1 (2-0-4-)4	BCS201 CS-III	BCR218 GP – 3 (1-0-0) 1 Credit	17	1	10	**23**
4	BCL202 Computer Networks (3-0-2)4	BCV201 Skill Development - 1 (1-0-2)2	BCL204 Operating System (3-0-2)4	Open Elective – 2 (3-0-0)3	Program Elective-2 (2-0-4)4	BCL206 Analysis and Design of Algorithms (3-0-2)4	BCS202 CS-IV (140Hrs)* 2 Credit	BCR 219 GP-4 (1-0-0-) 1 Credit	16	0	12	**24**
Summer	BCT301 Summer Training - II											3
5	BSL101 Entrepreneurship (2-0-2)3	BCL303 Introduction to AI & ML (3-0-2)4	BCL305 Software Engineering (3-0-2-)4	Program Elective-3 (2-0-4-)4	BCV301 Skill Development - 2 (1-0-2)2	BCD301 Project – 1 Semester at Industry/Startup Project (0-0-8)4	BCS301 CS-V	BCR318 GP-5 (1-0-0) 1Credit	12	0	20	**22**
6	Program Elective-4 (2-0-4)4	Open Elective-3 (3-0-0)3	BCD302 Project – 2 Semester at Industry/Startup Project (0-0-12)6				BCS302 CS-VI (140Hrs) 2 Credit	BCR319 GP-6 (1-0-0) 1Credit	06	0	16	**16**
						Total			77	5	72	**129**

* Students can utilize the summer/winter break period to complete the remaining 140 Community Service hours every year

Department of Electrical, Electronics and Communication Engineering

The department of Electrical, Electronics and Communication Engineering offers the following programs during the academic year 2022-23.

Master of Technology (M.Tech)

- Electronics and Communication Engineering with specialization in Communication Engineering
- Electronics and Communication Engineering with specialization in VLSI Design

Bachelor of Technology (B.Tech)

- Electronics and Communication Engineering
- Electronics and Communication Engineering with specialization in Internet of Things (IoT)
- Electronics and Communication Engineering with specialization in Embedded Systems and VLSI design

Bachelors of Computer Applications (BCA)
- Mobile Applications

M.Tech Full Time (2 years) is a well - balanced, industry driven, and research aligned curriculum that ensures integrating theory with real-world applications. Holistic pedagogy and emphasis on development of additional technical skills helps students to head start their career in core industries. PG Diploma (Exit option after one year for PG Diploma in relevant specialization) is a 1 year of study in the M.Tech program followed by an exit of 10 credit bridge courses lasting two months, including a 7-credit job-specific internship/apprenticeship and 3 credit skill based course that would help the graduates acquire job ready competencies required to enter the workforce. M.Tech Part Time (3 years) is a specially designed three years program for working professional with flexible teaching pedagogy and flexible credit-based system to ensure smooth learning along with the routine office work. The curriculum is designed in such a way that there are specialization options in communication engineering or VLSI design. Students can opt for any one of these specializations by taking the seminar, minor project and dissertation in those specializations. There is a lot of emphasis on research and project work based on the specialization chosen by the student starting from 3rd semester.

The curriculum of B.Tech. Electronics and Communication Engineering program helps an overall development of the student in various aspects desired for a successful career in engineering while being aware of his societal responsibilities and limitations. It develops basic competence required to pursue advanced study and research in Electronics and Communication Engineering and related disciplines. While framing the curriculum, not only the technological development in Electronics and Communication Engineering but also the technological development in Internet of Things, Information technology, biotechnology, mechatronics, computers, Internet of things, Embedded Systems and VLSI design have been taken into account. The B.Tech programme curriculum is designed in such a way that there are two specalization options each having a total credits of 178.

Bachelor's in computer applications (BCA) with specialization in Mobile Applications curriculum emphasizes on the technical and practical aspects of the computer applications. BCA Course is an undergraduate program where students are exposed to various areas of computer applications including the latest developments in the industry. In addition to all the mandatory subjects of a traditional BCA, this specialized course offers in-depth practical know-how of the current trends. Mobile Application sectors have the potential to grow exponentially, and they provide challenging job opportunities for young professionals with the right skill sets.

Department of EECE

Bachelor of Technology in Electronics & Communication Engineering

with Specialization in Embedded System & VLSI Design

Basic Science Courses

		L-T-P	C
MAL151	Engineering Maths -I	3-0-2	4
MAL152	Engineering Maths -II	3-0-2	4
PHY150	Engineering Physics	3-0-2	4
CHL150	Engineering Chemistry	2-0-2	3

Engineering Science Courses

		L-T-P	C
CSL106	FOCP I	2-0-4	4
CSL108	FOCP II	2-0-4	4
MEP110	Engineering Graphics & Drawing	1-0-4	3
MEL160	Basics of Mechanical Engineering	2-0-2	3
ECL 110	Basics of Electrical & Electronics Engineering	2-0-2	3
CSL110	Problem Solving and design thinking	2-0-2	3

Program Core

		L-T-P	C
ECL251	Analog Electronics and Integrated Circuit	3-0-2	4
ECL253	Fields, waves and Antennas	3-0-2	4
ECL255	Digital Electronics and Computer Architecture	3-0-2	4
CSL225	Programming for Data Science	2-0-4	4
ECL256	Embedded System Design	3-0-2	4
ECL252	Microcontrollers & Sensors	3-0-2	4
ECL254	Analog and Digital Communication	3-0-2	4
ECL258	Signal Processing	3-0-2	4
CSL236	Introduction to AI & ML	3-0-2	4
ECL270	Control Systems and Power Electronics	3-0-2	4
ECL302	Data Communication and Networks	3-0-2	4
ECL361	Data Structures & OOPs	3-0-2	4
ECL362	Real Time operating Systems	3-0-2	4
	Self Study Course GATE	Audit	

General Proficiency

		C
ECR107	General Proficiency-I	1
ECR108	General Proficiency -II	1
ECR207	General Proficiency -III	1
ECR208	General Proficiency -IV	1
ECR307	General Proficiency -V	1
ECR308	General Proficiency -VI	1

*Upto 20% of courses can be done through MOOC courses subject to department approval

Program/Specialization Electives

		L-T-P	C
ECL261	Linux & Scripting	2-0-4	4
ECL263	CMOS VLSI Design & Layout	2-0-4	4
ECL264	RTL Design & Synthesis	2-0-4	4
ECL366	VLSI Physical Design	2-0-4	4
ECL364	Verification Methodologies & Bus Architecture	2-0-4	4
ECl461	Embedded Systems & VLSI Industry: Employment & Higher Studies Trends	2-0-4	4

Humanities and Management Courses

		L-T-P	C
CLL101	Effective Communications I	2-1-0	2.5
CLL102	Effective Communications II	2-1-0	2.5
SML300	Entrepreneurship	3-0-0	3

University-Wide Compulsory Courses

		L-T-P	C
CHL100	Environmental Studies	3-0-0	3
CLL120	Human Values and Professional Ethics	2-0-0	2
CLP300	Campus to Corporate	1-0-0	1

Other Mandatory Courses

		L-T-P	C
	Open Elective – 1	3-0-0	3
	Open Elective – 2	3-0-0	3
	Open Elective – 3	3-0-0	3
	Open Elective – 4	3-0-0	3
	Open Elective – 5	3-0-0	3
	Foreign Language Elective	3-0-0	3
	Liberal Arts Course	3-0-0	3

Project & Internship (P)

		L-T-P	C
ECD401	Project – I		4
ECD402	Project – II/ Internship		6
ECV201	Skill Development	0-0-2	1
ECC301	Seminar		1
ECT101	In House Summer Internship		1
ECT201	Practical Training		2
ECT301	Industrial Internship		3

*Open electives can be chosen from University list of Open Elective courses

Department of EECE

Bachelor of Technology in Electronics & Communication Engineering with Specialization in Internet of Things

Basic Science Courses

		L-T-P	C
MAL151	Engineering Maths -I	3-0-2	4
MAL152	Engineering Maths -II	3-0-2	4
PHY150	Engineering Physics	3-0-2	4
CHL150	Engineering Chemistry	2-0-2	3

Engineering Science Courses

		L-T-P	C
CSL106	FOCP I	2-0-4	4
CSL108	FOCP II	2-0-4	4
MEP110	Engineering Graphics & Drawing	1-0-4	3
MEL160	Basics of Mechanical Engineering	2-0-2	3
ECL 110	Basics of Electrical & Electronics Engineering	2-0-2	3
CSL110	Problem Solving and design thinking	2-0-2	3

Program Core

		L-T-P	C
ECL251	Analog Electronics and Integrated Circuit	3-0-2	4
ECL253	Fields, waves and Antennas	3-0-2	4
ECL255	Digital Electronics and Computer Architecture	3-0-2	4
CSL225	Programming for Data Science	2-0-4	4
ECL256	Embedded System Design	3-0-2	4
ECL252	Microcontrollers & Sensors	3-0-2	4
ECL254	Analog and Digital Communication	3-0-2	4
ECL258	Signal Processing	3-0-2	4
CSL236	Introduction to AI & ML	3-0-2	4
ECL270	Control Systems and Power Electronics	3-0-2	4
ECL302	Data Communication and Networks	3-0-2	4
ECL361	Data Structures & OOPs	3-0-2	4
ECL362	Real Time operating Systems	3-0-2	4
	Self Study Course GATE	Audit	

General Proficiency

		C
ECR107	General Proficiency-I	1
ECR108	General Proficiency -II	1
ECR207	General Proficiency -III	1
ECR208	General Proficiency -IV	1
ECR307	General Proficiency -V	1
ECR308	General Proficiency -VI	1

*Upto 20% of courses can be done through MOOC courses subject to department approval

Program/Specialization Electives

		L-T-P	C
CSL238	Intro to cloud computing	2-0-4	4
CSL253	Webframe Works	2-0-4	4
ECL316	Wireless and Mobile Communication	2-0-4	4
ECL352	Design for IOT I	2-0-4	4
ECL451	Image Processing and computer vision	2-0-4	4
ECL352	Design for IOT II	2-0-4	4

Humanities and Management Courses

		L-T-P	C
CLL101	Effective Communications I	2-1-0	2.5
CLL102	Effective Communications II	2-1-0	2.5
SML300	Entrepreneurship	3-0-0	3

University-Wide Compulsory Courses

		L-T-P	C
CHL100	Environmental Studies	3-0-0	3
CLL120	Human Values and Professional Ethics	2-0-0	2
CLP300	Campus to Corporate	1-0-0	1

Other Mandatory Courses

	L-T-P	C
Open Elective – 1	3-0-0	3
Open Elective – 2	3-0-0	3
Open Elective – 3	3-0-0	3
Open Elective – 4	3-0-0	3
Open Elective – 5	3-0-0	3
Foreign Language Elective	3-0-0	3
Liberal Arts Course	3-0-0	3

Project & Internship (P)

		L-T-P	C
ECD401	Project – I		4
ECD402	Project – II/ Internship		6
ECV201	Skill Development	0-0-2	1
ECC301	Seminar		1
ECT101	In House Summer Internship		1
ECT201	Practical Training		2
ECT301	Industrial Internship		3

*Open electives can be chosen from University list of Open Elective courses

Bachelor of Technology in Electronics and Communication Engineering- (2022-23)

Sem	Semester Course Code, Course Name (L-T-P) Credits						GP	CS	L	T	P	Contact Hrs	Credits
1	MAL151 Engg Maths-I (3-0-2)4	CSL106 FOCP-I (2-0-4)4	CHL150 Engg Chemistry (2-0-2)3	CLL101 Effective Communication -I (2-1-0)2.5	MEP110 Engineering Graphics & Drawing (1-0-4)3	ECL110 Basic of Electrical & Electronics Engineering (2-0-2)3	ECR107 GP 1 Credits	ECS 101 CS-I	12	1	14	27	19.5+1 =20.5
2	MAL152 Engg Maths-II (3-0-2)4	CSL108 FOCP-II (2-0-4)4	PYL150 Engineering Physics (3-0-2)4	CLL102 Effective Communication -II (2-1-0)2.5	MEL160 Basic of Mechanical Engg. (2-0-2)3	CSL110 Problem Solving and Design Thinking (2-0-2)3	ECR108 GP 1 Credits	ECS 102 CS-II (140-Hrs)* 2 Credit	14	1	12	27	20.5+3 =23.5
Summer	ECT101 In House Summer Internship												1
3	ECL251 Analog Electronics & Integrated circuits (3-0-2)4	ECL253 Fields, waves and Antennas (3-0-2)4	ECL255 DE & CA (3-0-2)4	CSL225 Programming for data science (2-0-4)4	SML300 Entrepreneurship (3-0-0)3	ECL361 Data Structures (3-0-2)4	ECR207 GP 1 Credits	ECS 201 CS-III	14		12	26	23+1=24
4	ECL256 Embedded System Design (3-0-2)4	SML170 Liberal arts (3-0-0)3	ECL254 Analog and Digital Communications (3-0-2)4	ECL258 Signal processing (3-0-2)4	Program Elective-1 (2-0-4)4	Open Elective – 1* (MOOC) (3-0-0)3	ECR208GP 1 Credits	ECS 202 CS-IV (140-Hrs)* 2 Credit	17		12	27	23+3=26
Summer	ECT201 Industrial Training/Swachha Bharat internship												02
5	CSL236 Introduction to AI & ML/CSL242 AI for Games (3-0-2)4	ECL 270 Control systems and power electronics (3-0-2)4	Program Elective-2 (2-0-4)4	ECL252 Micro Controllers & Sensors (3-0-2)4	Open Elective-2 (3-0-0)3	CLL120 HVPE (2-0-0-)2	ECV201 Skill Development 1 Credit / ECR307 GP 1 Credits	ECS 301 CS-V	15		12	26	22+1=23
6	ECL302 Data comm and networks (3-0-2) 4	Program Elective-3 (2-0-4)4	ECL362 Real Time Operating Systems(3-0-2)4	Program Elective-4 (2-0-4)4	Open Elective – 3* (MOOC) (3-0-0)3	CLP300 Campus to Corporate (1-0-0)1	ECC301 Seminar 1 Credit / ECR308 GP 1 Credits	ECS 302 CS-VI (140-Hrs)* 2 Credit	14		12	26	21+3=24
Summer	ECT301 Industrial Training												03
7		Program Elective-5 (2-0-4)4	ECD401 Project # 1 4 Credits	Open Elective – 4* (MOOC) (3-0-0)3	CHL100 EVS (3-0-0)3	Foreign Language (3-0-0)3		ECS 401 CS-VII	14	4		18	17
8	Program Elective-6 (2-0-4)4	Open Elective – 5* (MOOC) (3-0-0)3	ECD402 Project # 2 /Internship 6 Credits	SEG 400 Self-Study Course GATE Audit				ECS 402 CS-VIII (140-Hrs) 2 Credits	12			12	12+2=14
	Total								106	2	78		178

- *Students can utilize summer or winter break period to complete remaining 140 community service hours.

Program Electives for each track

Tracks	IOT	Embedded System & VLSI Design
Program Elective-1	CSL238 Intro to cloud computing	ECL261 Linux & Scripting
Program Elective-2	CSL253 WebFrame Works	ECL263 CMOS VLSI Design & Layout
Program Elective-3	ECL316 Wireless & Mobile Communication	ECL264 RTL Design & Synthesis
Program Elective-4	ECL352 Design for IOT I	ECL366 VLSI Physical Design
Program Elective-5	ECL451 Image Processing and Computer Vision I	ECL364 Verification Methodologies & Bus Architectures
Program Elective-6	ECL353 Design for IoT II	ECL461 Embedded Systems and VLSI Industry: Employment & Higher Studies Trends

Bachelor of Technology in Electronics and Communication Engineering with Specialization Track in IOT (2022-23)

Highlights of B.Tech in ECE with specialization track in Internet of Things

Internet of Things is among the newest innovations in the field of information technology. It is the network of physical devices, home appliances, vehicles and other items embedded with electronics, software, actuators, sensors connected through network which enable these objects to connect and exchange data. It is set to create a huge wave in the common man's life and change the way we receive information.

Internet of Things specialization is designed to deliver the key aspect of technologies that collectively lead to this new concept. It allows students to explore the enabling technologies such as microcontrollers, instrumentation, sensors and wireless networks. Leading business organizations have started focusing on the opportunities thrown up by Internet of Things like smart cities; therefore, companies are in search of professionals who have strong foundational knowledge in the concepts of Internet of Things. Students with B.Tech. (ECE) with specialization in Internet of Things will get to know the benefits of a connected world and smart cities.

- **Learning Outcomes of this Track:**

- Interpret unique ways of communication between the human world and physical devices.
- Apply practical knowledge on IoT sensors, microcontrollers, networks, cloud computing and machine learning to develop IoT systems.
- Develop latest web application and programming skills including python and applications in machine learning and AI.
- Employ both electronics and computer science engineering technologies with focus on both hardware and software.
- Analyze and interpret the future trends associated with IoT devices and its various components.
- Design real life projects like home automation, smart parking etc. where information can be extracted from devices and used for enhancement of the techniques used in the business.
- Use several tools and techniques that tackle real-world problems and generate suitable solutions.

Career Options:

IoT Data analytics

IoT Hardware engineer

Embedded Programs Engineer

IoT Architect

IoT Developer

Network Engineer

Bachelor of Technology in Electronics and Communication Engineering with Specialization Track in ES-VLSI (2022-23)

Highlights of B.Tech (ECE) with specialization Track in Embedded Systems & VLSI Design

Embedded and VLSI Industry are the future of Indian and Global Electronics and Computer industry. This world of electronics and computer engineers has tremendous growth opportunities in various sectors as, Domestic Electronics, Medical Science, Automobile, Aircraft, Mobile, Computing, IoT, Entertainment, Banking, Robotics, and many more. The demand for the Embedded and VLSI design engineers is quite high in India to develop Systems, Software, Hardware-Software Co-design Models, SoC, ASIC, Standard Cells, and Verification. This course aims to prepare students to be industry ready for Embedded Systems and Semiconductors Industry segment for the PAN India and Global market. Also, since India is running short in skilled workforce in Embedded Systems and VLSI Design, this course of BTech in ECE with Specialization in Embedded Systems and VLSI Design shall create skilled and productive engineers for these industries in order to fulfill the skills shortage gaps.

Learning Outcomes of this Track:

1. Develop the concepts of automation during the design cycle phase by compiling on Linux OS and using Scripting Languages.

2. Analyze and implement the fundamental concepts of designing of Digital and Analog circuits and systems using CMOS devices and standard cells.

3. Apply the CMOS design rules, static and dynamic logic structures, interconnect analysis, CMOS chip layout, simulation, verification, testing, and low power techniques in the VLSI system and sub-system design.

4. Plan, create and implement the hardware, software, Co-design design test models at the complex embedded systems in our day to day life.

5. Evaluate, describe, validate and optimize embedded electronic systems in different areas of industrial application such as automobile, aircraft, house-hold, communications, robotics, etc.

6. Use the embedded and VLSI tools and technologies to meet the real world challenges and propose suitable solution for them.

Career Options:

RTL Design Engineer	Firmware Developer Engineer-WLAN/CAN/RTOS/FPGA
Verification Engineer	Microcontroller/Device Driver Engineer
Synthesis Engineer	System Architecture Engineer
Software Testing	Android Middleware Validation Engineer
DFT Engineer	Software & Automotive Engineers
Product & Validation Engineer	Hardware Design Engineer
FPGA Engineer	System Testing Engineer
Physical Design Engineer	
Layout Design Engineer	
Analog Design Engineer	
SoC Design Engineer	
EDA Development	

Department of EECE

M. Tech in Electronics and Communication Engineering

(With specialization in Communication Engineering / VLSI Design)
2022

M.Tech full time (2 years)

Sem	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5	Subject 6	L	T	P	Weekly Contact Hours	Credits
I	ECL505 Adv. Digital Communication 3-0-2(4)	ECL523 Digital VLSI Design 3-0-2(4)	Program Elective-1 3-0-2(4)	Program Elective-2 3-0-2 (4)	ECC509 Seminar 0-0-4(2)	ECS501 Community Service	12	0	12	24	18
II	ECL501 Digital Signal Processing 3-0-2(4)	ECL513 Machine Learning 2-0-2(3)	Program Elective-3 3-0-2(4)	Program Elective-4 3-0-2(4)	ECD512 Minor Project 0-0-10(5)	ECS502 Community Service (140 hours = 2 credit)*	11	0	18	19	22
III	MAL616 Research Methodology 2-1-0(3)	Open Elective 2-0-2(3)	ECD605 Dissertation-I 0-0-12(6)	Program Elective-5 3-0-2(4)		ECS601 Community Service	7	1	16	12	16
IV	ECD602 Dissertation-II 0-0-24(12)					ECS602 Community Service (140 hours = 2 credit)*	0	0	24	-	14
TOTAL CREDITS OF THE M.TECH DEGREE PROGRAMME = 70											70

*Students can utilize the summer/winter break period to complete the 140 Community Service hours every year

Department of EECE
M. Tech in Electronics and Communication Engineering
(With specialization in Communication Engineering / VLSI Design)
2022

PG Diploma with 1 year exit

Sem	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5	Subject 6	L	T	P	Weekly Contact Hours	Credits
I	ECL505 Adv. Digital Communication 3-0-2(4)	ECL523 Digital VLSI Design 3-0-2(4)	Program Elective-1 3-0-2(4)	Program Elective-2 3-0-2 (4)	ECC509 Seminar 0-0-4(2)	ECS501 Community Service	12	0	12	24	18
II	ECL501 Digital Signal Processing 3-0-2(4)	ECL513 Machine Learning 2-0-2(3)	Program Elective-3 3-0-2(4)	Program Elective-4 3-0-2(4)	ECD512 Minor Project 0-0-10(5)	ECS502 Community Service (140 hours = 2 credit)*	11	0	18	19	22
Summer	ECV502 Skill based course (3)	ECT502 Industrial Internship (7)									10
EXIT OPTION: PG DIPLOMA; CREDITS = 50											50

*Students can utilize the summer/winter break period to complete the 140 Community Service hours in a year

Department of EECE
M.Tech in Electronics and Communication Engineering
(With specialization in Communication Engineering / VLSI Design)
2022
M.Tech Part time (3 years)

Sem	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5	L	T	P	Weekly Contact Hours	Credits
I	ECL505 Adv. Digital Communication 3-0-2(4)	ECL523 Digital VLSI Design 3-0-2(4)	Program Elective-1 3-0-2(4)		ECS501 Community Service	9	0	6	15	12
II	ECL501 Digital Signal Processing 3-0-2(4)	ECL513 Machine Learning 2-0-2(3)	Program Elective-2 3-0-2 (4)	ECC509 Seminar 0-0-4(2)	ECS502 Community Service (140 hours = 2 credit)*	8	0	10	18	15
III	Program Elective-3 3-0-2(4)	Open Elective 2-0-2(3)	MAL616 Research Methodology 2-1-0(3)		ECS601 Community Service	7	1	4	12	10
IV	Program Elective-4 3-0-2(4)	ECD512 Minor Project 0-0-10(5)			ECS602 Community Service (140 hours = 2 credit)*	3	0	12	5	11
V	Program Elective-5 3-0-2(4)	ECD605 Dissertation-I 0-0-12(6)				3	0	14	5	10
VI	ECD602 Dissertation-II 0-0-24(12)					0	0	24	-	12
TOTAL CREDITS OF THE M.TECH DEGREE PROGRAMME = 70										70

*Students can utilize the summer/winter break period to complete the 140 Community Service hours every year

Department of EECE
M. Tech in Electronics and Communication Engineering
(With specialization in Communication Engineering / VLSI Design)
2022

Program Core					
Adv. Digital Communication		Digital VLSI Design		Digital Signal Processing	
Machine Learning		Research Methodology		Seminar	
Minor Project		Dissertation- I		Dissertation- II	

Program Electives					
TRACK I: Communication Engineering			TRACK II: VLSI Design		
ECL506 Optical Communication	ECL502 Digital Image Processing	ECL621 Statistical Signal Processing	ECL525 Semiconductor device modeling and Technology	ECL530 Computer Aided VLSI Design	ECL631 Design of VLSI systems
ECL517 Information Theory and Coding	ECL504 Modern Telecom Switching	ECL623 Telecom Network Management	ECL527 Digital System Design with Verilog HDL	ECL538 Hardware Software CoDesign	ECL633 Mixed Signal Design
ECL535 Microwave Theory and Circuits	ECL508 Wireless Mobile communication	ECL611 Mobile Computing	ECL531 Design and Analysis of Computer Architecture	ECL540 Real Time Systems and Software	ECL635 Microwave and Optoelectronic Devices
ECL537 Detection and Estimation Theory	ECL562 Millimeter Wave Integrated Circuits	ECL653 Telecom Systems and Technologies	ECL536 VLSI Fabrication and Technology	ECL542 Designing with ASICs	ECL637 VLSI Test and Testability
ECL539 Speech Communication	ECL570 Internet of Things	ECL655 Access Networks	ECL532 Embedded System Design	ECL528 Analog VLSI Design	ECL524 Low Power VLSI Design
ECL532 Embedded System Design	ECL572 Modern Antennas and Arrays	ECL657 Wireless Sensor Networks	ECL542 Special Topics in VLSI Design	ECL570 Internet of Things	ECL625 ASIC Design and Verification with SV
ECL516 Special Topics in Electronics and Communication	ECL578 Broadband Communication	ECL659 Global Navigation Satellite Systems and Applications	ECL534 CMOS RF Circuit Design	ECL629 Cryptography and Crypto Chip Design	ECL627 MEMS
ECL564 Soft Computing	ECL576 Network Security	ECL601 Cloud Computing	ECL582 Data structures & algorithms using C++	ECL529 Linux & Scripting	ECL601 Cloud Computing
ECL640 Satellite Communication					

BCA (Mobile Applications)

Market Trends of Internet of Things (IoT):

- The global market valued at USD 154.09 billion in 2019 and expected to grow at CAGR of 11.5% from 2020 to 2027

- As per 42matters.com on Google Play (a) there are around 30K app publishers from India i.e. 3% of all publishers on Google Play and (b) more than 1.5 lacs apps from Indian publishers out of 27.8 lacs apps globally (6% Globally)

- All modern trade players are moving to mobile only experience and big corporates like TATA and Reliance are launching super apps which combines all services under one app

Unique Selling Points of the Specialization:

- Industry aligned curriculum, designed by Industry Experts
- Well-trained and qualified faculty
- Project Guidance & Mentoring by Industry Experts
- Blended Learning 24 * 7
- Well Equipped Labs for hands on learning
- Holistic Pedagogy-Emphasis on development of additional skills with strong emphasis on:
    - Communication & soft skill modules
    - Compulsory Foreign Language course
    - Large number of open electives with interdisciplinary learning
    - Flexibility in curriculum to choose electives
    - Exposure through Fine Arts and Liberal Study courses for creative thinking

Career Options:

- Programming Engineer/Developer
- Versatile Application Developer
- Android /iOS Developer
- Effects Programmer
- Java / C++ / C# /Python Programmer
- Mobile Application Developer
- Objective C Programmer
- System Analyst/Engineers
- Windows Mobile App Developer

Bachelor of Computer Applications with specialization in Mobile Applications

Sem	Semester Course Code, Course Name (L-T-P) Credits						GP	CS	Hrs. Per week L	T	P	Contact Hrs	Credits
1	MAL153 Mathematics-I (3-1-0)4	CLL101 Effective Comm-1 (2-0-1)2.5	BCL103 Programming Fund -I (2-0-4)4	BSL102 Principles of Management (2-0-2)3	CHL100 Environmental Studies (3-0-0-)3		BCR107 GP 1 Credits	BCS 101 CS-1	12	1	7	20	17.5
2	MAL206 Mathematical Statistics (3-1-0)4	CLL102 Effective Comm-II (2-0-1)2.5	CLL120 Human Values & Professional Ethics (2-0-0-)2	BCL104 Programming Fundamentals-II (JAVA) (2-0-4)4	BCL110 Problem Solving and Design Thinking (2-0-2)3	Foreign Language Elective 1 (1-2-0)3	BCR108 GP 1 Credits	BCS 102 CS-II (140-Hrs)* 2 Credit	12	3	7	22	18.5+3 =21.5
Summer	BCT 101 In House Summer Internship including 7 days community service												01
3	BCL205 DE & CA (3-0-2)4	BCL207 RDBMS (3-0-2)4	BCL201 Data Structures (3-0-2)4	Program Elective-1 (2-0-4)4	PCL102 Psychology for living (2-1-0)3	Open Elective – 1* (MOOC) (3-0-0)3	BCR207 GP 1 Credits	BCS 201 CS-III	16	1	10	27	22+1= 23
4	BCL204 Operating Systems (3-0-2)4	BCL208 IOT and Cloud Computing (3-0-2)4	Program Elective-2 (2-0-4)4	BCL210 Mobile Computing (3-0-2)4	Open Elective – 2* (MOOC) (3-0-0)3	BCV202 Skill Development 1 (1-0-2)2	BCR208 GP 1 Credits	BCS 202 CS-IV (140-Hrs)* 2 Credit	15		12	27	21+3= 24
Summer	BCT 201 Industrial Training/Swachha Bharat internship including 7 days community service												02
5	BCL307 Data comm and networks (3-0-2)4	Program Elective-3 (2-0-4)4	BCL309 Machine Learning in Mobile application (3-0-2) 4	BSL101 Entrepreneurship (2-0-2)3	BCD303 Project – 1 Semester at Industry/Start up Project 4 Credits	BCV203 Skill Development 2 (1-0-2)2	BCR307 GP 1 Credits	BCS 301 CS-V	11		12	23	21+1= 22
6	Program Elective-4 (2-0-4)4	Open Elective – 3* (MOOC) (3-0-0)3	BCD305 Project – 2 Semester at Industry/Start up Project 6 Credits				BCR308 GP 1 Credits	BCS 302 CS-VI (140-Hrs)* 2 Credit	5		4	9	13+3= 16
Total								123+6+6					127

- *Students can utilize summer or winter break period to complete remaining 140 community service hours

Program Electives for each track

Tracks	BCA with Mobile Applications
Program Elective-1	BCL213 Android and iOS Operating Systems
Program Elective-2	BCL214 Flutter for Mobile App Development
Program Elective-3	BCL313 Mobile Arch & app development
Program Elective-4	BCL314 Mobile Security